

Appendix A Review of Economics in Influential Delta Studies (Part One)

There have been many studies, plans, and reports about the Delta in the past two decades. The majority of these studies have been focused on scientific rather than economic aspects of Delta issues. The relative lack of economic research is somewhat surprising given that the statewide concerns regarding the future of the Delta are as much about economics as environmental concerns.

The most influential economic analysis to date has been contained within large, comprehensive reports that were not primarily focused on economics. These include a series of reports published by the Public Policy Institute of California (PPIC) and the Delta Risk Management Study (DRMS). These reports do provide a significant amount of valuable background information and are initial attempts to investigate the complex economic issues in the Delta. Like many initial attempts to study a question, the economic research in these reports has shortcomings, and is insufficient to support the strong conclusions that have been made. In particular, the PPIC reports have advocated for the construction of a peripheral canal around the Delta on economic criteria, and the DRMS study contained widely quoted estimates of economic costs associated with the failure of Delta levees. These two reports have provided the primary economic justification for building large, isolated water conveyance facilities around the Delta.

Because of the influence of these studies on Delta planning efforts, the Delta Protection Commission requested an independent review of the economic analysis in key reports. Of particular interest is the PPIC Comparing Futures Report (2008) that recommended a peripheral canal, and the Delta Risk Management Strategy Phase 1 Report (2009). In addition, some economic aspects of other PPIC reports are worth mentioning. Finally, the DPC also requested a review of the levee decisions study by Suddeth, Mount, and Lund (2010) that was originally published as an Appendix to the 2008 PPIC Comparing Futures study. The levee decisions study claims that it is not economically efficient to upgrade most Delta levees and repair levee breaches and that large numbers of Delta islands should be permanently flooded over time.

The following is a summary of significant concerns identified with these studies' economic data, analysis, and conclusions.

1 PPIC Comparing Futures Report (2008)¹

- Errors and limitations in the analytical framework favor the option of a peripheral canal.
 1. Does not utilize the conventional, present discounted value approach to evaluating investments. In particular, their unconventional approach ignores the financially significant 10-25 year time to build a canal when costs are incurred without benefits.
 2. Only evaluates benefits in a single distant year when benefits are at a peak due to an assumed 100% loss in ability to export water from south Delta. Even if one accepts the assumption that water exports are eventually cut by 100%, a conventional present discounted value approach would properly account for the fact that the benefits of a canal would start small and grow over time.
 3. Market values for fishery improvements are ignored.

¹ <http://www.ppic.org/main/publication.asp?i=810>

4. Non-market values for fisheries and environmental improvement are also ignored because these techniques are “too controversial”.

5. Because the framework does not place an economic value on fisheries/environment, their analytical framework is limited in its ability to recommend any policy. It can only recommend a choice that is best on both environmental/fishery and economic/water supply criteria. Although their analysis did not find a strategy that was best on both criteria, the authors presented their endorsement of a peripheral canal as a scientific conclusion rather than a subjective opinion about the relative value of environmental improvement. As discussed above and below, it is also very important to note that the conclusion that the peripheral canal is the best economic strategy is highly questionable due to the approach and data employed.

- Various assumptions exaggerate costs of reduced water exports, especially to urban users, and therefore favor a peripheral canal over reducing water exports. (See Appendix H of Comparing Futures for most of these assumptions).

1. Overestimated urban water scarcity by using an extremely high projection of population growth of 65 million in 2050, and justifying it with a reference to Department of Finance projections which were actually less than 60 million, not 65 million. They later revealed that their source was Landis and Reilly (2003)², a study that assumed the 2000 population was nearly 1 million higher than the 2000 Census and was based on DOF projections from the 1990s. DOF projections are notoriously high, and virtually all Census based forecasts at the time put the California population at 55 million in 2050, and updated projections based on the 2010 Census now estimate population below 55 million in 2050. Assuming over 10 million additional urban water customers than are likely to exist has significant impacts on the cost of reducing Delta water exports.

2. Overestimates cost of water recycling as an urban alternative. Their calculations assumed recycled wastewater would cost urban areas \$1,480 per acre foot (2008\$), even though other PPIC reports from the same time period cited costs of \$600/af, and a range of \$300-\$1300/af around the same time.³ Rather than using current cost estimates to calibrate their model, the authors utilized outdated cost estimates from the 1990s, and inflated them to 2008 dollars using an unrelated construction cost index.

3. Although less significant than the water recycling overestimate, Comparing Futures also overestimates cost of desalination as an urban alternative. Their calculations assumed desalinated water would cost urban areas \$2,072 per acre foot (2008\$), even though other PPIC reports from the same time period cited cost range of \$500-900af for brackish desalination and \$900-2500 af for seawater desalination. Rather than using current cost estimates to calibrate their model, the authors utilized outdated cost estimates from the 1990s, and inflated them to 2008 dollars using an unrelated construction cost index.

4. Since they are modeling 2050 costs, the high cost assumptions for water recycling and desalination are an implicit assumption that technology goes backwards over the next 40 years, despite recent and expected future cost savings in both technologies from new research and development.

5. Urban water scarcity costs are also exaggerated by ignoring conservation which many believe is the least costly source of urban water supply. They use old estimates of

²Landis and Reilly (2003), “How will we grow?” <http://escholarship.org/uc/item/8ff3q0ns#page-27>

³ See PPIC reports, California Water Myths (2009) and Water for Growth (2005).

urban water demand without making any allowance for gains already made in reducing urban demand with new technologies or accounting for expected new conservation.

6. For agriculture, they exaggerate the costs of water scarcity on San Joaquin Valley agriculture using the same models that incorrectly projected 90,000 lost jobs from the 2009 drought. Based on the 2009 drought episode, their costs of agricultural water scarcity are a minimum of three times and more likely six times too high.

7. Simple calculations show results are highly sensitive to just a few of these assumptions, and that their results are unlikely to hold under more realistic assumptions.⁴

- Other Issues

1. The current costs of isolated conveyance are much higher than they assumed for a peripheral canal, although the authors can't be blamed for changing cost estimates.

2. Authors have not demonstrated the results are robust to alternative, more realistic data assumptions.

2 Delta Risk Management Strategy (DRMS) Phase 1⁵

- Phase I study was sharply criticized, and independent reviewers warned that results only indicated directions of risks and numerical predictions should not be taken literally.

- Economic loss calculations in the report critically depend on the failure probabilities in DRMS that are considered too high by virtually all experts.

- In-Delta flood loss costs are exaggerated. Some examples:

1. Overly high flood risk is matched with high-value properties. For example, the Sargent-Barnhart tract in the Stockton Brookside neighborhood was developed in the late 1980s with over 200 year flood protection from modern levees as recently confirmed by DWR FloodSafe program maps. However, DRMS estimates the island has over 7% probability of flooding, 3rd highest of all Delta islands. It is obvious that DRMS is not incorporating substantial levee upgrades that occurred twenty years prior to the analysis. DRMS uses current economic asset data to repeatedly flood the over \$1 billion in real estate assets in Stockton's most expensive neighborhood.

2. Billions of dollars in South Sacramento real estate is defined as inside the Delta 100 year flood plain, when those properties are both outside the Delta and were recently removed from the 100-year floodplain due to levee improvements.

3. High-risk flooded islands are assumed to be rebuilt just as they were originally and are repeatedly flooded in the simulations. Complete rebuilding is unlikely for behavioral and policy reasons, exaggerating the losses.

- Losses from water export disruptions are exaggerated.

1. The analysis assumes that water managers would not employ several strategies to reduce the costs of temporary water shortages.

2. New analysis done for the BDCP and DWR shows that the exports pumps would be disabled for a much shorter period of time than estimated in DRMS.

⁴ For an example with a few parameters, see

<http://forecast.pacific.edu/articles/peripheral%20canal%20PPIC%20review.pdf>

⁵ http://www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/phase1_information.cfm

- Although the costs from DRMS were exaggerated, it has been made worse by frequent misuse and misinterpretation of results by others. The majority of the estimated losses are in-Delta, yet they are often portrayed as losses from water deliveries. Twenty five year cumulative losses are often portrayed as coming from a single event.

3 Suddeth, Mount and Lund (2010) Levee Decisions Study⁶

- Unlike the peripheral canal analysis by the same authors, this report evaluates levee investments with the present discounted value approach that explicitly considers the lack of benefits while costs are incurred during the building period. The framework is correct, but is notably inconsistent with the framework they used to evaluate the peripheral canal in the 2008 Comparing Futures report. Thus, they are evaluating levee investments with a much tougher framework than they used to evaluate a peripheral canal.
- Utilizes the high levee failure probabilities from the DRMS study which leads to what the recent National Academy of Sciences review of the BDCP refers to as “error propagation.”
- Utilizes very low values for Delta farmland (\$2500 per acre) that are substantially lower than current market values for Delta farmland (\$6000 per acre) that already include a significant discount for flood risk and levee costs. An argument could be made that the correct value for the analysis of rebuilding after flood would be comparably productive farmland without flood risk which sells for \$8,000 to \$12,000 per acre in the region.
- Some engineers have said the study underestimates the cost of reinforcing downwind islands when levees fail.
- Underestimates the infrastructure cost of island failures, although they do consider major transportation infrastructure and indicate western islands critical to water conveyance, this is only part of the infrastructure services.
- Does not consider possible effects on recreational activities in the Delta.
- The most recent, published version of the paper does illustrate results under some more realistic alternatives for land values and other parameters that significantly reduce the number of island that are “optimum” to leave flooded.
- The very expansive open water scenarios with twenty or more permanently flooded islands are clearly not economically optimal as the authors claim.
- We use an alternative scenario run by the authors with more realistic property and infrastructure values as the basis for our six-island open water scenario in the next part of the report. These six islands were relatively free of major infrastructure or permanent residents, produce lower-value crops, and are therefore more realistic to consider.

4 Conclusion

All of these influential reports have serious problems, and have incorrectly influenced decision makers towards alternatives that do not support economic sustainability in the Delta. In the case of the PPIC, it is important to note that two recent developments have provided real world demonstrations of the inaccuracy of the models we criticize above. The first episode was the 2009 drought. The negative impacts of the drought, particularly on San Joaquin Valley

⁶ <http://watershed.ucdavis.edu/pdf/Suddeth-Mount-et-al-2010-SFEWS.pdf>

agriculture, was wildly overestimated by UC-Davis/PPIC affiliated researchers using some of the same models used to justify the peripheral canal in the 2008 Comparing Futures study.⁷

Furthermore, when viewed in their entirety including reports not reviewed above, recent reports by the PPIC and UC-Davis researchers affiliated with the PPIC show a pattern of inconsistency in the way they assess and frame in-Delta versus out of Delta impacts. A few examples of anti-Delta include:

- Ignoring the construction time period and not using present discounted value approach when evaluating the peripheral canal, while imposing a much tougher standard that accounts for the lack of benefits during the construction period and present discounted value approach when evaluating investments in repairing breached levees.⁸
- In the Delta, they did not calculate economic impacts from lost agricultural production such as lost jobs when evaluating increased Delta salinity from isolated conveyance and they called up to \$200 million in Delta losses “notable for costs that it did not show.” However, similar studies at the same time of San Joaquin Valley agriculture described similar revenue losses as very severe economic costs, and applied huge estimates of economic impacts and job loss.
- The 2009 Water Myths report, the “No Villains” section notably leaves out in-Delta interests while casting south of Delta farmers, urban users, and environmentalists in a positive light.
- The 2009 Water Myths report labels water subsidies to Central Valley Project farmers a myth, while denouncing “large” subsidies for Delta farmers levees. The reality is that Delta farmers have historically paid much larger cost shares (50%) for levee improvements through subventions, and that these levees upgrades provide benefits to many groups other than the farmers, including water exporters. In contrast, the interest subsidies for the Central Valley Project are much larger than the levee subventions program, and provide purely private rather than statewide benefits.
- When modeling losses to urban and agricultural Delta water exporters, the PPIC uses assumptions from the high-range of available values for nearly all choices including water recycling, desalination, and population growth. In contrast, when modeling the decision of whether to rebuild Delta levees, they assume very low values of cost such as \$2500 per acre for Delta cropland and leave out several types of infrastructure costs.

Our review has found significant problems with all of the reports and that the concerns of the Delta Protection Commission were well founded. There is a critical need to strengthen the economic knowledge base supporting Delta policy decisions, and there should be a commitment to economic research in the Delta that is comparable to the commitment to ecological research.

⁷ There is no weblink or reference to these reports anymore, because the UC-Davis researchers have withdrawn the erroneous modeling and removed the study from their website.

⁸ See Delta Dilemmas (<http://agecon.ucdavis.edu/extension/update/issues/v10n4.pdf>) or the 2007 PPIC report, Envisioning Futures. If they were to treat in-Delta and south-of-Delta impacts consistently, the UC-Davis researchers would have applied their 50 jobs per \$1million agricultural employment multiplier that they were using in many studies of south of Delta agriculture at the same time. At up to \$200 million in losses, they would have said their salinity modeling showed that up to 10,000 jobs could be lost in the Delta.

Appendix B: Overview of the People and Economy of the Delta (Chapter 2)

This appendix discusses data and specific issues of concern associated with the socioeconomic information sources considered by the Economic Sustainability Plan (ESP), including:

- U.S. Census Bureau Decennial Census (1990, 2000, and 2010) – Population and household growth trends;
- U.S. Census Bureau American Community Survey (2005-2009 five-year estimates) – Socioeconomic snapshot, including age, race, ethnicity, income, education, and other factors;
- U.S. Census Bureau Local Employment Dynamics – Employment by place of work for specific industry sectors; and
- IMPLAN – Input-output model base data.

This appendix also includes figures associated with Chapter 2.

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U.S. Census Bureau Decennial Census

The U.S. Census counts every resident in the United States every 10 years. The ESP relies on the decennial census to estimate changes in population and households within the Primary Delta Region and Secondary Delta Regions from 1990 through 2010.

Geography – The ESP uses census block data, the smallest geographic area for which the Bureau of the Census collects and tabulates decennial census data. The ESP relies on Delta boundary data and geographic information system (GIS) software to identify census blocks that are located within the Delta.

Data Issues – Census block geographies change over time. As areas urbanize, the Census Bureau creates additional census blocks. The number of blocks within the Delta has increased significantly since 1990. The changing geographic definition of the blocks creates minor variations in the geographic area considered by the ESP to estimate population change.

U.S. Census Bureau American Community Survey

The American Community Survey (ACS) is an ongoing survey that provides data every year. The ACS collects detailed socioeconomic information, including age, sex, race, income, and education. The ESP relies on the most-recently released five-year estimates, data collected from January 1, 2005 to December 31, 2009. The ESP uses ACS data to provide a socioeconomic snapshot of the Delta regions and Legacy Community areas.

Geography – The ESP uses ACS data at the Census block group level. Delta block groups were identified using the Delta boundary data and GIS software.

Data Issues – Census block groups provide an imperfect fit with Delta boundaries. However, block groups are the smallest geographic area for which the Bureau of the Census provides current ACS data. In addition, it is important to note that the Census Bureau indicates that the strength of the ACS is in estimating characteristic distributions and recommends that users compare derived measures such as percents, means, medians, and rates, rather than estimates of population totals.

U.S. Census Bureau Local Employment Dynamics

The U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program combines federal and state administrative data on employers and employees with Census Bureau censuses and surveys. The LEHD program supports the Local Employment Dynamics (LED) partnership between state labor market information agencies and the U.S. Census Bureau to develop information about local labor market conditions. LED-LEHD employment data are derived from unemployment insurance wage records reported by employers and maintained

by state labor departments. The ESP relies on the LED-LEHD “On the Map” tool to estimate employment by industry trends in the Delta regions and surrounding counties.

Geography – The ESP relies on the LED-LEHD data to estimate employment within the Delta boundaries. Delta boundary data was analyzed with the LED-LEHD On the Map tool to generate data specific to each Delta zone. The ESP also considers LED-LEHD for the five-county region surrounding the Delta, for the purpose of comparison.

Data Issues – The LED-LEHD data undercount total employment in the Delta. Jobs that are exempt or otherwise not covered by unemployment insurance are not included in the LED-LEHD counts. According to the Bureau of Labor Statistics, wage and salary agricultural employees, self-employed farmers, self-employed nonagricultural workers, domestic workers, unpaid family workers, workers covered by the railroad unemployment insurance system, and state and local government workers may not be covered by unemployment insurance (and therefore would not be counted by LED-LEHD). In addition, some nonprofit employers, such as religious organizations, are given a choice of coverage or exclusion in a number of states, so data for their employees may be reported to a limited degree.

IMPLAN (Impact Analysis for Planning Model)

IMPLAN is an economic assessment software package and dataset that provides economic information by U.S. Postal Service ZIP code. IMPLAN relies on data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages, Regional Economic Information System (REIS), and County Business Patterns to estimate employment. IMPLAN employment estimates include wage and salary employees and self-employed jobs. Both full-time and part-time workers are included in employment estimates. IMPLAN estimates industry output data from a number of sources, including the Bureau of Economic Analysis’s Output Series and the Annual Survey of Manufacturers. The ESP relies on IMPLAN base data to evaluate employment and economic output in the Delta.¹

Geography – The ESP relies on a custom IMPLAN geography based on U.S. Postal Service ZIP codes.

Data Issues – IMPLAN ZIP code-level employment estimates rely on Census Bureau County Business Patterns data concerning the number of firms by firm size class. IMPLAN uses ZIP code-level employment estimates to distribute industry data from counties to ZIP code regions. In some cases, IMPLAN uses other factors to distribute data to sub-county areas. Of particular note, IMPLAN estimates agricultural sector data from current Census of Agriculture, but recommends user inputted data on agricultural outputs. In addition, it is important to note that ZIP code areas provide a highly imperfect fit with Delta boundaries.

¹ For more information on economic impact analysis see Appendix F

Figure B-1 Map of Primary and Secondary Zones of the Sacramento-San Joaquin Delta

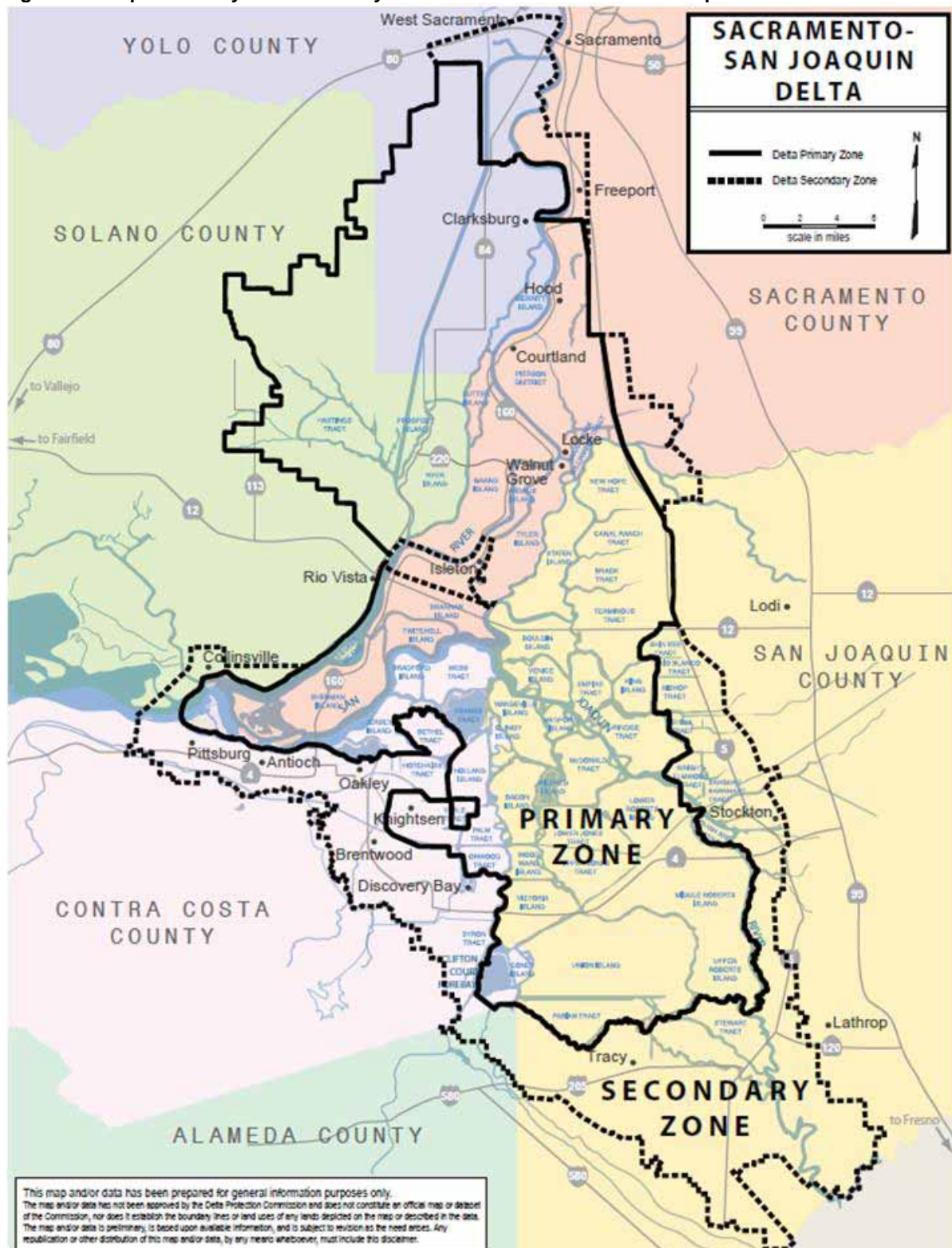


Table B-1 Population and Housing Growth Trends (Census Block Data), 1990-2010

	1990	2000	2010	Growth Rate			Annual Growth Rate		
				1990-2000	2000-2010	1990-2010	1990-2000	2000-2010	1990-2010
Primary Delta Zone ¹									
Population	12,146	12,298	11,551	1.3%	-6.1%	-4.9%	0.1%	-0.6%	-0.3%
Housing Units	4,495	4,549	4,955	1.2%	8.9%	10.2%	0.1%	0.9%	0.5%
Secondary Delta Zone ¹									
Population	358,530	449,109	559,040	25.3%	24.5%	55.9%	2.3%	2.2%	2.2%
Housing Units	133,106	158,311	199,185	18.9%	25.8%	49.6%	1.7%	2.3%	2.0%
Legal Delta ¹									
Population	370,676	461,407	570,591	24.5%	23.7%	53.9%	2.2%	2.1%	2.2%
Housing Units	137,601	162,860	204,140	18.4%	25.3%	48.4%	1.7%	2.3%	2.0%
5-County Region									
Population	2,807,092	3,299,115	3,767,312	17.5%	14.2%	34.2%	1.6%	1.3%	1.5%
Housing Units	1,072,551	1,214,651	1,417,702	13.2%	16.7%	32.2%	1.3%	1.6%	1.4%
California									
Population	29,760,021	33,871,648	37,253,956	13.8%	10.0%	25.2%	1.3%	1.0%	1.1%
Housing Units	11,182,882	12,214,549	13,680,081	9.2%	12.0%	22.3%	0.9%	1.1%	1.0%

Source: Decennial Census 1990, 2000, and 2010

¹ Note that geographic boundaries are estimated on a best-fit basis using block-level data which differ with each decennial census.

Figure B-2 Population Growth and Percent Change (Census Block Group Data), 2000-2010

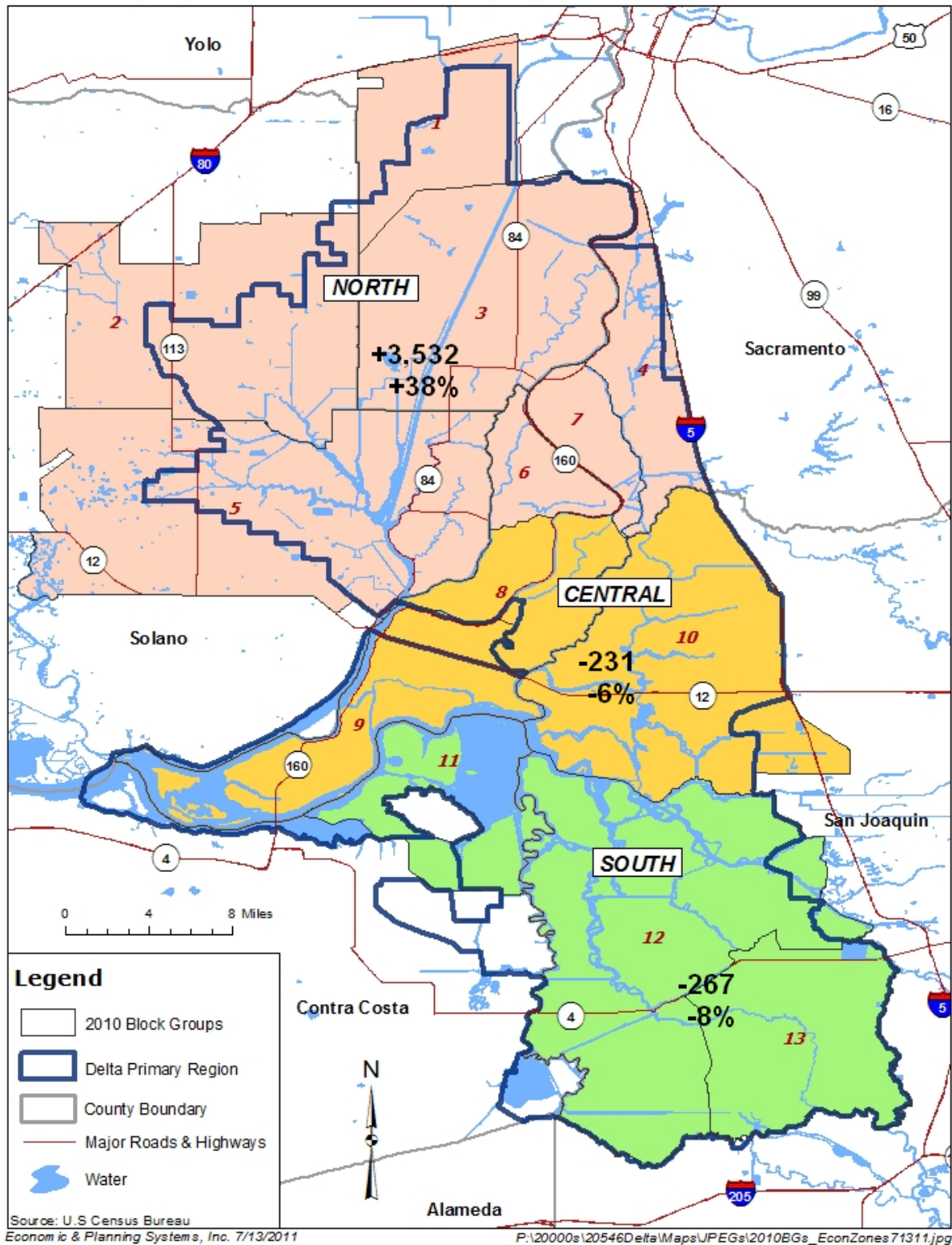


Table B-2 Population Growth Trend (Census Block Group Data), 2000 - 2010

Block Group Map No. ²	2000 Population	2010 Population	Population Change	Percent Change	Annual Percent Change
<u>North Delta</u>					
1	2,242	2,638	396	17.7%	1.6%
2	1,742	1,688	-54	-3.1%	-0.3%
3	1,301	1,275	-26	-2.0%	-0.2%
4	467	669	202	43.3%	3.7%
5	1,305	4,031	2,726	208.9%	11.9%
6	1,003	1,126	123	12.3%	1.2%
7	1,278	1,443	165	12.9%	1.2%
Subtotal	9,338	12,870	3,532	37.8%	3.3%
<u>Central Delta</u>					
8	615	738	123	20.0%	1.8%
9	1,934	1,984	50	2.6%	0.3%
10	1,576	1,172	-404	-25.6%	-2.9%
Subtotal	4,125	3,894	(231)	-5.6%	-0.6%
<u>South Delta</u>					
11	1,103	1,522	419	38.0%	3.3%
12	1,628	909	-719	-44.2%	-5.7%
13	807	840	33	4.1%	0.4%
Subtotal	3,538	3,271	(267)	-7.5%	-0.8%
Total	17,001	20,035	3,034	17.8%	1.7%

Source: Census 2000 and Census 2010; US Census Bureau

[1] Note that Census block groups provide a consistent geographic unit for time series analysis but are larger than Census blocks and therefore do not correspond to Delta boundaries as well.

[2] Refer to Figure 9.

Figure B-3 Map of 2000 Census Block Groups (Resident Demographics Analysis Areas)

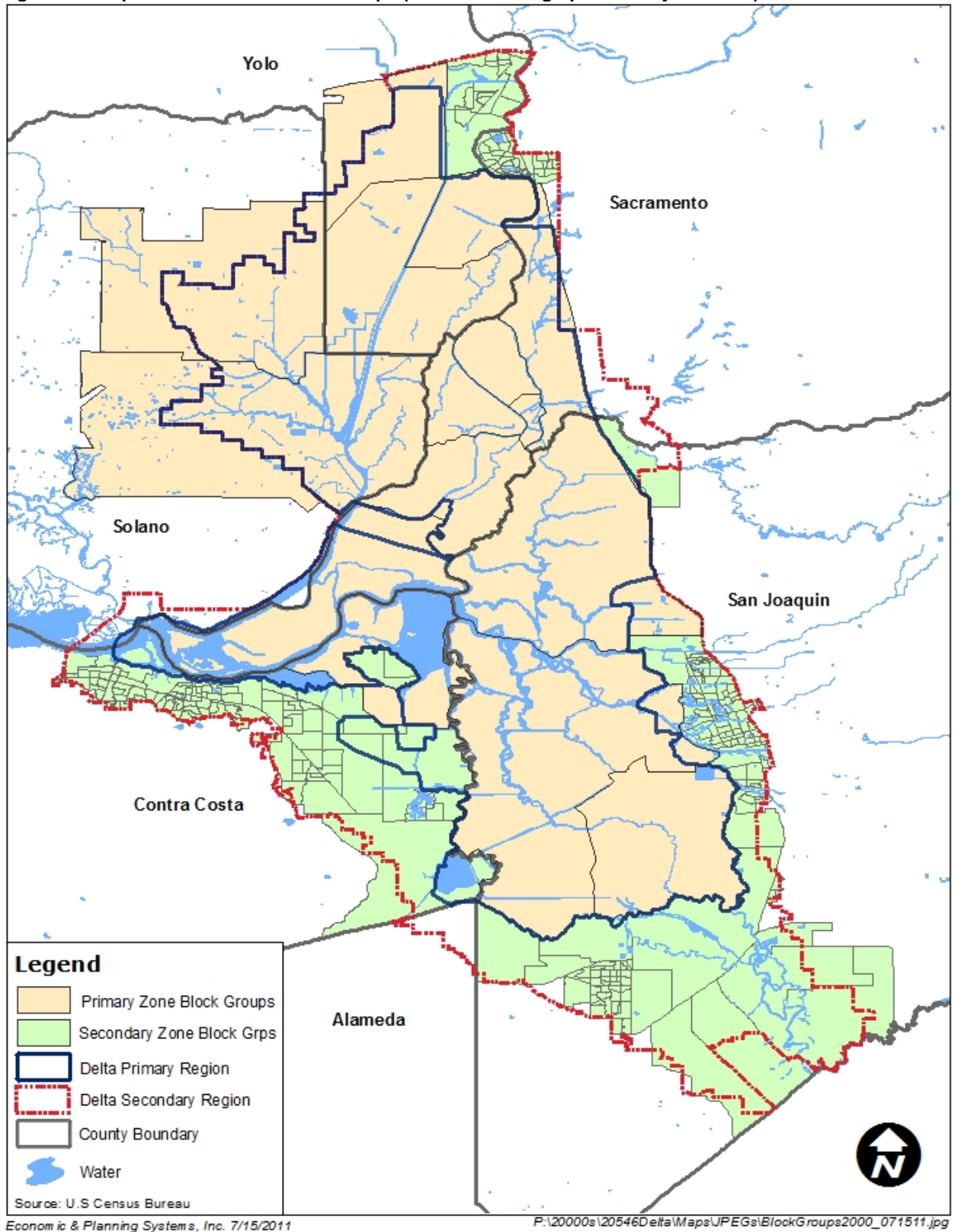


Table B-3 Population Age Distribution, 2005-9

Age Group	Primary Zone		Secondary Zone		Legal Delta		California	
	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total
Under 18 years	3,306	18.7%	165,212	29.1%	168,518	28.8%	9,439,758	26.0%
18 to 20 years	677	3.8%	25,033	4.4%	25,710	4.4%	1,591,538	4.4%
21 to 34 years	2,282	12.9%	104,650	18.4%	106,932	18.3%	7,342,468	20.2%
35 to 54 years	4,644	26.2%	165,169	29.1%	169,813	29.0%	10,401,836	28.6%
55 to 64 years	2,595	14.7%	52,519	9.3%	55,114	9.4%	3,561,732	9.8%
65 to 84 years	3,907	22.1%	47,546	8.4%	51,453	8.8%	3,427,648	9.4%
85 years and over	295	1.7%	7,346	1.3%	7,641	1.3%	543,547	1.5%
Total Population	17,706	100.0%	567,475	100.0%	585,181	100.0%	36,308,527	100.0%

Source: 2005-2009 American Community Survey 5-Year Estimates

Table B-4 Population Age Distribution, 2000

Age Group	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
Under 18 years	3,958	23.3%	143,561	30.3%	147,519	30.1%	9,221,463	27.2%
18 to 20 years	873	5.1%	20,149	4.3%	21,022	4.3%	1,470,250	4.3%
21 to 34 years	3,012	17.7%	86,887	18.3%	89,899	18.3%	7,049,803	20.8%
35 to 54 years	5,153	30.3%	141,957	30.0%	147,110	30.0%	9,955,906	29.4%
55 to 64 years	1,729	10.2%	35,557	7.5%	37,286	7.6%	2,587,432	7.6%
65 to 84 years	2,126	12.5%	40,633	8.6%	42,759	8.7%	3,171,059	9.4%
85 years and over	150	0.9%	5,086	1.1%	5,236	1.1%	415,735	1.2%
Total Population	17,001	100.0%	473,830	100.0%	490,831	100.0%	33,871,648	100.0%

Source: US Census Bureau, 2000 Census.

Table B-5 Household Type by Household Size, 2005-9

Geography	Type of Household			% of Total	% Family
	Family	Nonfamily	Total		
Primary Delta Zone					
1-person household	0	2,194	2,194	30%	0%
2-person household	2,551	446	2,997	41%	85%
3-person household	787	66	853	12%	92%
4-person household	674	0	674	9%	100%
5-person household	410	11	421	6%	97%
6-person household	207	0	207	3%	100%
7-or-more person household	32	0	32	0%	100%
Total Households	4,661	2,717	7,378	100%	63%
Secondary Delta Zone					
1-person household	0	39,706	39,706	21%	0%
2-person household	45,409	9,039	54,448	29%	83%
3-person household	30,040	1,320	31,360	17%	96%
4-person household	31,385	553	31,938	17%	98%
5-person household	17,089	56	17,145	9%	100%
6-person household	7,258	35	7,293	4%	100%
7-or-more person household	4,913	67	4,980	3%	99%
Total Households	136,094	50,776	186,870	100%	73%
Legal Delta					
1-person household	0	41,900	41,900	22%	0%
2-person household	47,960	9,485	57,445	30%	83%
3-person household	30,827	1,386	32,213	17%	96%
4-person household	32,059	553	32,612	17%	98%
5-person household	17,499	67	17,566	9%	100%
6-person household	7,465	35	7,500	4%	100%
7-or-more person household	4,945	67	5,012	3%	99%
Total Households	140,755	53,493	194,248	100%	72%
California					
1-person household	0	2,993,951	2,993,951	25%	0%
2-person household	2,961,992	680,958	3,642,950	30%	81%
3-person household	1,853,349	110,371	1,963,720	16%	94%
4-person household	1,829,930	45,999	1,875,929	15%	98%
5-person household	957,814	13,785	971,599	8%	99%
6-person household	412,961	4,730	417,691	3%	99%
7-or-more person household	317,644	3,707	321,351	3%	99%
Total Households	8,333,690	3,853,501	12,187,191	100%	68%

Source: 2005-2009 American Community Survey 5-Year Estimates

Table B-6 Population by Racial Distribution, 2005-9

Race	Primary Zone		Secondary Zone		Legal Delta		California	
	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total
White alone	13,323	75.2%	319,146	56.2%	332,469	56.8%	22,258,042	61.3%
Black or African American alone	437	2.5%	62,992	11.1%	63,429	10.8%	2,249,404	6.2%
American Indian and Alaska Native alone	80	0.5%	4,236	0.7%	4,316	0.7%	283,031	0.8%
Asian alone	1,303	7.4%	74,330	13.1%	75,633	12.9%	4,473,292	12.3%
Native Hawaiian and Other Pacific Islander alone	56	0.3%	4,310	0.8%	4,366	0.7%	132,535	0.4%
Some other race alone	1,983	11.2%	70,484	12.4%	72,467	12.4%	5,639,234	15.5%
Two or more races	524	3.0%	31,977	5.6%	32,501	5.6%	1,272,989	3.5%
Total Population	17,706	100.0%	567,475	100.0%	585,181	100.0%	36,308,527	100.0%

Source: 2005-2009 American Community Survey 5-Year Estimates

Table B-7 Population by Racial Distribution, 2000

Race	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Total	% of Total	Total	% of Total	Total	% of Total
White alone	11,572	68.1%	277,118	58.5%	288,690	58.8%	20,122,959	59.4%
Black or African American alone	140	0.8%	44,748	9.4%	44,888	9.1%	2,219,190	6.6%
American Indian and Alaska Native alone	199	1.2%	3,944	0.8%	4,143	0.8%	312,215	0.9%
Asian alone	761	4.5%	55,668	11.7%	56,429	11.5%	3,682,975	10.9%
Native Hawaiian and Other Pacific Islander alone	77	0.5%	2,497	0.5%	2,574	0.5%	113,858	0.3%
Some other race alone	3,232	19.0%	57,303	12.1%	60,535	12.3%	5,725,844	16.9%
Two or more races	1,020	6.0%	32,552	6.9%	33,572	6.8%	1,694,607	5.0%
Total Population	17,001	100.0%	473,830	100.0%	490,831	100.0%	33,871,648	100.0%

Source: US Census Bureau, 2000 Census.

Table B-8 Population by Hispanic or Latino Origin, 2005-9

Ethnicity	Primary Zone		Secondary Zone		Legal Delta		California	
	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total
Not Hispanic	13,043	74%	394,765	70%	407,808	70%	23,206,366	64%
Hispanic	4,663	26%	172,710	30%	177,373	30%	13,102,161	36%
Total Population	17,706	100%	567,475	100%	585,181	100%	36,308,527	100%

Source: 2005-2009 American Community Survey 5-Year Estimates

Table B-9 Population by Hispanic or Latino Origin, 2000

Ethnicity	Primary Zone		Secondary Zone		Legal Delta		California	
	Total	% of Total	Total	% of Total	Total	% of Total	Total	% of Total
Not Hispanic	10,794	63%	355,536	75%	366,330	75%	22,902,516	68%
Hispanic	6,207	37%	118,294	25%	124,501	25%	10,969,132	32%
Total Population	17,001	100%	473,830	100%	490,831	100%	33,871,648	100%

Source: US Census Bureau, 2000 Census.

Table B-10 Educational Attainment (Population 25 years and older), 2005-9

Education Level Attained	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
No high school diploma	2,336	18.4%	59,348	17.1%	61,684	17.2%	4,537,564	19.5%
High school graduate/GED or higher	10,392	81.6%	286,942	82.9%	297,334	82.8%	18,681,653	80.5%
Associates degree or higher	4,607	36.2%	108,490	31.3%	113,097	31.5%	8,677,691	37.4%
Bachelor's degree or higher	3,399	26.7%	76,720	22.2%	80,119	22.3%	6,906,266	29.7%
Graduate or professional degree	1,110	8.7%	22,213	6.4%	23,323	6.5%	2,477,938	10.7%
Population (25 yrs and over)	12,728		346,290		359,018		23,219,217	

Source: 2005-2009 American Community Survey 5-Year Estimates

Table B-11 Household Income Distribution, 2005-9 (2009\$)

Income	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
Less than \$15,000	946	12.8%	17,695	9.5%	18,641	9.6%	1,276,553	10.5%
\$15,000 to \$34,999	1,575	21.3%	30,431	16.3%	32,006	16.5%	2,276,900	18.7%
\$35,000 to \$49,999	968	13.1%	24,204	13.0%	25,172	13.0%	1,560,204	12.8%
\$50,000 to \$74,999	1,335	18.1%	35,046	18.8%	36,381	18.7%	2,169,105	17.8%
\$75,000 to \$99,999	914	12.4%	28,133	15.1%	29,047	15.0%	1,564,337	12.8%
\$100,000 to \$149,999	928	12.6%	31,658	16.9%	32,586	16.8%	1,817,134	14.9%
\$150,000 or more	712	9.7%	19,703	10.5%	20,415	10.5%	1,522,958	12.5%
Total Households	7,378	100.0%	186,870	100.0%	194,248	100.0%	12,187,191	100.0%
Avg. Household Income	\$72,090		\$79,513		\$79,231		\$82,948	

Source: 2005-2009 American Community Survey 5-Year Estimates

Table B-12 Housing Units, 2005-9

Item	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
Total Housing Units	8,353	100.0%	204,657	100.0%	213,010	100.0%	13,268,682	100.0%
Occupancy Status								
Occupied	7,378	88.3%	186,870	91.3%	194,248	91.2%	12,187,191	91.8%
Vacant	975	11.7%	17,787	8.7%	18,762	8.8%	1,081,491	8.2%
Tenure								
Owner occupied	5,264	71.3%	123,239	65.9%	128,503	66.2%	7,061,432	57.9%
Renter occupied	<u>2,114</u>	<u>28.7%</u>	<u>63,631</u>	<u>34.1%</u>	<u>65,745</u>	<u>33.8%</u>	<u>5,125,759</u>	<u>42.1%</u>
Total Occupied	7,378	100.0%	186,870	100.0%	194,248	100.0%	12,187,191	100.0%

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table B-13 Foreclosure Rates 2010-11

Geography [1]	Total Foreclosures [2]	Total Housing Units	Foreclosure Rate
Primary Zone	126	2,989	4.2%
Secondary Zone	16,233	165,794	9.8%
Legal Delta	16,359	168,783	9.7%
Five-County Region [3]	118,136	1,388,568	8.5%
California	781,580	13,369,685	5.8%

[1] Delta geographies approximated based on USPS zip code areas.

[2] Reported foreclosures May 2010 through April 2011.

[3] Includes Sacramento, Contra Costa, San Joaquin, Solano, and Yolo counties

Sources: RealtyTrac.com; Claritas

Table B-14 Resident Labor Force and Unemployment, 2005-9

	Primary Zone	Secondary Zone	Legal Delta	California
Population ¹	18,960	240,759	259,719	27,958,467
% In Labor Force ²	54%	64%	63%	65%
% Not In Labor Force	46%	36%	37%	35%
Unemployment Rate	7%	10%	9%	8%
Employed Residents / Capita	0.50	0.58	0.57	0.60

[1] Reflects Census tract-level data. Labor force data not reported for Block Groups.

[2] Labor Force Participation Rate.

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table B-15 Employed Resident Labor Force by Industry, 2005-9

Industry	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
Agriculture, forestry, fishing and hunting	913	12.2%	3,182	1.3%	4,095	1.6%	313,253	1.9%
Mining, quarrying, and oil and gas extraction	0	0.0%	261	0.1%	261	0.1%	24,849	0.2%
Construction	733	9.8%	22,517	9.1%	23,250	9.1%	1,224,186	7.6%
Manufacturing	539	7.2%	20,001	8.1%	20,540	8.1%	1,745,489	10.8%
Wholesale trade	190	2.5%	7,582	3.1%	7,772	3.0%	587,055	3.6%
Retail trade	480	6.4%	30,795	12.4%	31,275	12.3%	1,825,116	11.3%
Transportation and warehousing	214	2.9%	12,573	5.1%	12,787	5.0%	655,333	4.0%
Utilities	170	2.3%	2,675	1.1%	2,845	1.1%	121,548	0.7%
Information	87	1.2%	6,112	2.5%	6,199	2.4%	504,146	3.1%
Finance and insurance	317	4.2%	13,111	5.3%	13,428	5.3%	767,202	4.7%
Real estate and rental and leasing	227	3.0%	6,270	2.5%	6,497	2.5%	427,471	2.6%
Professional, scientific, and technical services	553	7.4%	12,506	5.0%	13,059	5.1%	1,230,831	7.6%
Management of companies and enterprises	0	0.0%	158	0.1%	158	0.1%	13,178	0.1%
Admin. and support and waste mgmt svcs	377	5.0%	12,311	5.0%	12,688	5.0%	764,304	4.7%
Educational services	804	10.7%	18,841	7.6%	19,645	7.7%	1,389,786	8.6%
Health care and social assistance	592	7.9%	31,445	12.7%	32,037	12.6%	1,842,893	11.4%
Arts, entertainment, and recreation	129	1.7%	4,015	1.6%	4,144	1.6%	412,522	2.5%
Accommodation and food services	327	4.4%	13,935	5.6%	14,262	5.6%	1,097,674	6.8%
Other services, except public administration	360	4.8%	12,153	4.9%	12,513	4.9%	860,520	5.3%
Public administration	470	6.3%	17,217	7.0%	17,687	6.9%	743,350	4.6%
Total Employment	7,482	100.0%	247,660	100.0%	255,142	100.0%	16,212,604	100.0%

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table B-16 Employed Resident Labor Force by Type of Employer, 2005-9

Type of Employer	Primary Zone		Secondary Zone		Legal Delta		California	
	Count	% of Total	Count	% of Total	Count	% of Total	Count	% of Total
Private For-Profit Wage and Salary	4,682	63%	169,237	68%	173,919	68%	11,667,399	70%
Private Not-For-Profit Wage and Salary	508	7%	15,970	6%	16,478	6%	1,022,634	6%
Local Government	724	10%	24,302	10%	25,026	10%	1,396,197	8%
State Government	578	8%	14,342	6%	14,920	6%	639,662	4%
Federal Government	224	3%	6,120	2%	6,344	2%	335,024	2%
Self-Employed (Own Not Incorporated Business)	766	10%	17,326	7%	18,092	7%	1,454,684	9%
Unpaid Family Workers	0	0%	363	0.1%	363	0%	35,106	0%
Total Employed Laborforce	7,482	100%	247,660	100%	255,142	100%	16,550,706	100%

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table B-17 Commuting Patterns to and from the Primary Zone, 2009

Place of Residence For Delta Workers	Primary		Place of Work for Delta Residents	Primary	
	Count	Share		Count	Share
<i>Primary Delta</i>	493	11%	<i>Primary Delta</i>	493	12%
Top Origins			Top Destinations		
Stockton city, CA	639	15%	Sacramento city, CA	257	6%
Sacramento city, CA	290	7%	Stockton city, CA	236	6%
Galt city, CA	155	4%	Rio Vista city, CA	142	3%
Lodi city, CA	129	3%	San Francisco city, CA	132	3%
Elk Grove city, CA	120	3%	San Jose city, CA	87	2%
Rio Vista city, CA	110	3%	Oakland city, CA	83	2%
Brentwood city, CA	79	2%	Brentwood city, CA	66	2%
Antioch city, CA	65	1%	Fairfield city, CA	59	1%
Discovery Bay CDP, CA	55	1%	West Sacramento city, CA	59	1%
			Lodi city, CA	58	1%
Industry Class			Industry Class		
Goods Producing	2,783	64%	Goods Producing	1,113	27%
Trade, Transportation, and Utilities	256	6%	Trade, Transportation, and Utilities	749	18%
All Other Services	1,321	30%	All Other Services	2,196	54%
Total Workers	4,360	100%	Total Employed Residents	4,058	100%

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009)

Table B-18 Commuting Patterns to and from the Secondary Zone, 2009

Place of Residence For Delta Workers	Secondary		Place of Work for Delta Residents	Secondary	
	Count	Share		Count	Share
<i>Secondary Delta</i>	40,217	30%	<i>Secondary Delta</i>	40,217	22%
Top Origins			Top Destinations		
Stockton city, CA	23,071	17%	Stockton city, CA	26,587	14%
Antioch city, CA	7,946	6%	Sacramento city, CA	12,558	7%
Sacramento city, CA	7,305	5%	San Francisco city, CA	6,838	4%
Tracy city, CA	5,496	4%	Antioch city, CA	6,729	4%
Pittsburg city, CA	3,672	3%	Tracy city, CA	5,941	3%
Manteca city, CA	2,930	2%	Concord city, CA	5,735	3%
Brentwood city, CA	2,887	2%	Oakland city, CA	4,937	3%
Oakley city, CA	2,820	2%	San Jose city, CA	4,889	3%
Lodi city, CA	2,594	2%	Pittsburg city, CA	4,367	2%
Modesto city, CA	2,508	2%	Walnut Creek city, CA	3,861	2%
Industry Class			Industry Class		
Goods Producing	19,310	14%	Goods Producing	29,813	16%
Trade, Transportation, and Utilities	31,564	24%	Trade, Transportation, and Utilities	36,834	20%
All Other Services	83,129	62%	All Other Services	117,504	64%
Total Workers	134,003	100%	Total Employed Residents	184,151	100%

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009)

Table B-19 Commuting Patterns to and from the Legal Delta, 2009

Place of Residence For Delta Workers	Legal Zone		Place of Work for Delta Residents	Legal Zone	
	Count	Share		Count	Share
<i>Legal Delta</i>	42,053	30%	<i>Legal Delta</i>	42,053	22%
Top Origins			Top Destinations		
Stockton city, CA	23,710	17%	Stockton city, CA	26,823	14%
Antioch city, CA	8,011	6%	Sacramento city, CA	12,815	7%
Sacramento city, CA	7,595	5%	San Francisco city, CA	6,970	4%
Tracy city, CA	5,549	4%	Antioch city, CA	6,776	4%
Pittsburg city, CA	3,694	3%	Tracy city, CA	5,998	3%
Brentwood city, CA	2,966	2%	Concord city, CA	5,773	3%
Manteca city, CA	2,961	2%	Oakland city, CA	5,020	3%
Oakley city, CA	2,872	2%	San Jose city, CA	4,976	3%
Lodi city, CA	2,723	2%	Pittsburg city, CA	4,397	2%
Modesto city, CA	2,528	2%	Walnut Creek city, CA	3,899	2%
Industry Class			Industry Class		
Goods Producing	22,093	16%	Goods Producing	30,926	16%
Trade, Transportation, and Utilities	31,820	23%	Trade, Transportation, and Utilities	37,583	20%
All Other Services	84,450	61%	All Other Services	119,700	64%
Total Workers	138,363	100%	Total Employed Residents	188,209	100%

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009)

Table B-20 Employment in the Primary Zone

Industry (NAICS)	2002	2006	2007	2008	2009	Distribution	
						2002-2009	2007-2009
Agriculture, Forestry, Fishing and Hunting	4,031	2,079	2,341	2,361	1,057	57.7%	44.3%
Mining, Quarrying, and Oil and Gas Extraction	0	1	1	3	18	0.1%	0.2%
Utilities	10	14	25	21	16	0.3%	0.5%
Construction	230	245	199	174	794	6.3%	9.0%
Manufacturing	73	157	161	196	914	5.0%	9.8%
Wholesale Trade	139	108	130	141	68	2.8%	2.6%
Retail Trade	89	59	69	56	136	1.6%	2.0%
Transportation and Warehousing	44	33	38	43	36	0.8%	0.9%
Information	31	4	6	2	32	0.2%	0.3%
Finance and Insurance	15	13	20	18	80	0.5%	0.9%
Real Estate and Rental and Leasing	95	481	419	101	53	3.8%	4.4%
Professional, Scientific, and Technical Services	51	59	66	63	91	1.3%	1.7%
Management of Companies and Enterprises	0	1	0	0	43	0.1%	0.3%
Administration, Waste Management and Remediation	36	87	79	104	192	1.9%	2.9%
Educational Services	225	214	217	248	217	4.7%	5.2%
Health Care and Social Assistance	41	36	36	41	192	1.2%	2.1%
Arts, Entertainment, and Recreation	130	96	71	80	47	2.0%	1.5%
Accommodation and Food Services	222	252	247	233	224	5.1%	5.4%
Other Services (excluding Public Administration)	158	201	283	305	127	4.2%	5.5%
Public Administration	21	12	11	24	23	0.3%	0.4%
Total	5,641	4,152	4,419	4,214	4,360	100.0%	100.0%

Source: US Census Bureau LED-LEHD

Table B-21 Employment in the Secondary Zone

Industry (NAICS)	2002	2006	2007	2008	2009	Distribution	
						2002-2009	2007-2009
Agriculture, Forestry, Fishing and Hunting	3,439	2,766	2,900	2,995	3,419	2.3%	2.2%
Mining, Quarrying, and Oil and Gas Extraction	420	68	46	39	240	0.1%	0.1%
Utilities	1,118	1,233	1,250	1,180	1,137	0.8%	0.9%
Construction	9,553	11,084	12,665	9,503	6,512	7.4%	6.9%
Manufacturing	10,801	10,879	10,783	10,323	9,139	7.6%	7.2%
Wholesale Trade	5,542	7,258	8,051	7,813	6,319	4.9%	5.3%
Retail Trade	16,588	18,858	17,999	18,150	17,699	12.8%	12.9%
Transportation and Warehousing	7,987	7,868	7,430	7,486	6,409	5.5%	5.1%
Information	1,043	917	1,330	1,385	1,682	0.9%	1.1%
Finance and Insurance	3,509	3,870	3,624	3,345	4,655	2.8%	2.8%
Real Estate and Rental and Leasing	2,336	2,734	2,357	2,419	2,199	1.8%	1.7%
Professional, Scientific, and Technical Services	7,036	5,306	4,812	4,674	4,655	4.5%	3.4%
Management of Companies and Enterprises	2,782	1,292	1,268	1,274	1,417	1.3%	0.9%
Administration, Waste Management and Remediation	7,608	9,821	9,662	8,461	6,761	6.4%	6.0%
Educational Services	16,550	17,137	17,305	18,355	16,811	12.4%	12.6%
Health Care and Social Assistance	11,513	12,716	13,069	13,671	16,122	9.5%	10.3%
Arts, Entertainment, and Recreation	2,795	2,741	2,680	2,743	2,636	2.0%	1.9%
Accommodation and Food Services	10,016	12,939	13,559	13,736	12,334	8.9%	9.5%
Other Services (excluding Public Administration)	5,130	5,721	7,486	8,335	8,067	4.8%	5.7%
Public Administration	3,792	4,085	4,094	4,949	5,790	3.2%	3.6%
Total	129,558	139,293	142,370	140,836	134,003	100.0%	100.0%

Source: US Census Bureau LED-LEHD

Table B-22 Employment in the Legal Delta

Industry (NAICS)	2002	2006	2007	2008	2009	Distribution	
						2002-2009	2007-2009
Agriculture, Forestry, Fishing and Hunting	7,470	4,845	5,241	5,356	4,476	4.2%	3.5%
Mining, Quarrying, and Oil and Gas Extraction	420	69	47	42	258	0.1%	0.1%
Utilities	1,128	1,247	1,275	1,201	1,153	0.8%	0.8%
Construction	9,783	11,329	12,864	9,677	7,306	7.4%	6.9%
Manufacturing	10,874	11,036	10,944	10,519	10,053	7.5%	7.3%
Wholesale Trade	5,681	7,366	8,181	7,954	6,387	4.9%	5.2%
Retail Trade	16,677	18,917	18,068	18,206	17,835	12.4%	12.6%
Transportation and Warehousing	8,031	7,901	7,468	7,529	6,445	5.3%	5.0%
Information	1,074	921	1,336	1,387	1,714	0.8%	1.0%
Finance and Insurance	3,524	3,883	3,644	3,363	4,735	2.7%	2.7%
Real Estate and Rental and Leasing	2,431	3,215	2,776	2,520	2,252	1.9%	1.8%
Professional, Scientific, and Technical Services	7,087	5,365	4,878	4,737	4,746	4.4%	3.3%
Management of Companies and Enterprises	2,782	1,293	1,268	1,274	1,460	1.3%	0.9%
Administration, Waste Management and Remediation	7,644	9,908	9,741	8,565	6,953	6.3%	5.9%
Educational Services	16,775	17,351	17,522	18,603	17,028	12.2%	12.4%
Health Care and Social Assistance	11,554	12,752	13,105	13,712	16,314	9.2%	10.0%
Arts, Entertainment, and Recreation	2,925	2,837	2,751	2,823	2,683	2.0%	1.9%
Accommodation and Food Services	10,238	13,191	13,806	13,969	12,558	8.8%	9.4%
Other Services (excluding Public Administration)	5,288	5,922	7,769	8,640	8,194	4.8%	5.7%
Public Administration	3,813	4,097	4,105	4,973	5,813	3.1%	3.5%
Total	135,199	143,445	146,789	145,050	138,363	100.0%	100.0%

Source: US Census Bureau LED-LEHD

Table B-23 Employment in the Five-County Delta Region [1]

Industry (NAICS)	2002	2006	2007	2008	2009	Distribution	
						2002-2009	2007-2009
Agriculture, Forestry, Fishing and Hunting	24,899	19,771	21,663	21,055	20,393	1.8%	1.7%
Mining, Quarrying, and Oil and Gas Extraction	2,061	1,507	1,685	1,869	2,139	0.1%	0.2%
Utilities	9,930	9,951	9,731	9,963	10,501	0.8%	0.8%
Construction	89,295	100,482	98,404	84,767	66,283	7.3%	6.6%
Manufacturing	85,357	86,967	85,301	84,483	78,983	6.6%	6.6%
Wholesale Trade	44,255	46,780	48,506	47,331	42,234	3.6%	3.7%
Retail Trade	148,010	155,656	150,127	148,137	137,541	11.9%	11.5%
Transportation and Warehousing	41,458	41,742	39,540	40,325	38,088	3.2%	3.1%
Information	25,816	25,280	26,707	22,988	21,405	2.0%	1.9%
Finance and Insurance	68,811	71,506	68,106	62,845	60,028	5.4%	5.0%
Real Estate and Rental and Leasing	22,962	25,344	22,007	20,253	21,300	1.8%	1.7%
Professional, Scientific, and Technical Services	69,727	71,056	72,946	74,591	71,970	5.7%	5.8%
Management of Companies and Enterprises	21,215	18,026	18,608	22,024	22,830	1.6%	1.7%
Administration, Waste Management and Remediation	72,343	78,893	75,730	78,815	66,005	5.9%	5.8%
Educational Services	127,953	131,539	137,541	146,622	144,899	10.8%	11.3%
Health Care and Social Assistance	127,598	141,588	147,545	155,726	159,681	11.3%	12.2%
Arts, Entertainment, and Recreation	23,465	23,215	23,339	23,220	25,079	1.9%	1.9%
Accommodation and Food Services	91,127	104,809	106,524	107,578	100,040	8.0%	8.3%
Other Services (excluding Public Administration)	69,077	77,007	68,786	74,020	75,769	6.0%	5.8%
Public Administration	51,119	52,072	48,771	57,161	61,452	4.2%	4.4%
Total	1,216,478	1,283,191	1,271,567	1,283,773	1,226,620	100.0%	100.0%

[1] Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties.

Source: US Census Bureau LED-LEHD

Table B-24 Location Quotient Analysis of the Primary Delta vs. California

Industry (NAICS)	Primary Zone		California		Primary Zone LQ [1]	
	Employment [2]	% of Total (a)	Employment [2]	% of Total (b)	LQ (c) = (a) / (b)	Rank
Agriculture, Forestry, Fishing and Hunting	1,920	44.3%	326,747	2.3%	19.60	1
Mining, Quarrying, and Oil and Gas Extraction	7	0.2%	22,637	0.2%	1.08	4
Utilities	21	0.5%	99,258	0.7%	0.69	7
Construction	389	9.0%	752,771	5.2%	1.72	3
Manufacturing	424	9.8%	1,388,320	9.6%	1.02	5
Wholesale Trade	113	2.6%	681,034	4.7%	0.55	10
Retail Trade	87	2.0%	1,527,751	10.6%	0.19	18
Transportation and Warehousing	39	0.9%	449,460	3.1%	0.29	13
Information	13	0.3%	499,268	3.5%	0.09	20
Finance and Insurance	39	0.9%	558,209	3.9%	0.24	15
Real Estate and Rental and Leasing	191	4.4%	272,687	1.9%	2.34	2
Professional, Scientific, and Technical Services	73	1.7%	1,039,534	7.2%	0.24	14
Management of Companies and Enterprises	14	0.3%	230,883	1.6%	0.21	16
Administration, Waste Management and Remediation	125	2.9%	862,640	6.0%	0.48	12
Educational Services	227	5.2%	1,384,810	9.6%	0.55	11
Health Care and Social Assistance	90	2.1%	1,521,372	10.5%	0.20	17
Arts, Entertainment, and Recreation	66	1.5%	319,245	2.2%	0.69	8
Accommodation and Food Services	235	5.4%	1,265,346	8.8%	0.62	9
Other Services (excluding Public Administration)	238	5.5%	804,329	5.6%	0.99	6
Public Administration	19	0.4%	444,714	3.1%	0.15	19

[1] LQ (Location Quotient): The ratio of the share of employment in a specific industry locally to the share of employment in the same industry regionally.

[2] Average employment level 2007-2009.

Source: US Census Bureau LED-LEHD

Table B-25 Location Quotient Analysis of the Legal Delta vs. California

Industry (NAICS)	Legal Delta		California		Legal Delta LQ [1]	
	Employment [2]	% of Total (a)	Employment [2]	% of Total (b)	LQ (c) = (a) / (b)	Rank
Agriculture, Forestry, Fishing and Hunting	5,024	3.5%	326,747	2.3%	1.55	2
Mining, Quarrying, and Oil and Gas Extraction	116	0.1%	22,637	0.2%	0.51	18
Utilities	1,210	0.8%	99,258	0.7%	1.23	5
Construction	9,949	6.9%	752,771	5.2%	1.33	3
Manufacturing	10,505	7.3%	1,388,320	9.6%	0.76	15
Wholesale Trade	7,507	5.2%	681,034	4.7%	1.11	8
Retail Trade	18,036	12.6%	1,527,751	10.6%	1.19	6
Transportation and Warehousing	7,147	5.0%	449,460	3.1%	1.60	1
Information	1,479	1.0%	499,268	3.5%	0.30	20
Finance and Insurance	3,914	2.7%	558,209	3.9%	0.71	16
Real Estate and Rental and Leasing	2,516	1.8%	272,687	1.9%	0.93	13
Professional, Scientific, and Technical Services	4,787	3.3%	1,039,534	7.2%	0.46	19
Management of Companies and Enterprises	1,334	0.9%	230,883	1.6%	0.58	17
Administration, Waste Management and Remediation	8,420	5.9%	862,640	6.0%	0.98	11
Educational Services	17,718	12.4%	1,384,810	9.6%	1.29	4
Health Care and Social Assistance	14,377	10.0%	1,521,372	10.5%	0.95	12
Arts, Entertainment, and Recreation	2,752	1.9%	319,245	2.2%	0.87	14
Accommodation and Food Services	13,444	9.4%	1,265,346	8.8%	1.07	9
Other Services (excluding Public Administration)	8,201	5.7%	804,329	5.6%	1.03	10
Public Administration	4,964	3.5%	444,714	3.1%	1.12	7

[1] LQ (Location Quotient): The ratio of the share of employment in a specific industry locally to the share of employment in the same industry regionally.

[2] Average employment level 2007-2009.

Source: US Census Bureau LED-LEHD

Table B-26 Sacramento River Corridor Industry Analysis [1]

NAICS Code	Industry Sector	Output		Employment		Gross Regional		Total Industry Exports		Exports as a % of Output	Net Exports
		(Revenues/Sales)	%	Amount	%	Amount	%	Amount	%		
11	Agriculture, Forestry, Fishing & Hunting	\$88,264,177	15%	606	21%	\$38,370,596	10%	\$73,548,912	20%	83%	\$46,519,134
21	Mining, including Oil & Gas Extraction	\$0	0%	0	0.0%	\$0	0%	\$0	0%	-	\$0
22	Utilities	\$211,883,035	36%	220	7%	\$149,017,498	40%	\$200,267,567	53%	95%	\$144,567,998
23	Construction	\$20,846,579	4%	136	5%	\$10,626,467	3%	\$4,386,978	1%	21%	(\$4,049,459)
31-33	Manufacturing	\$50,903,632	9%	117	4%	\$14,519,690	4%	\$46,951,887	13%	92%	\$18,295,911
311-2	Food & Beverage Manufacturing	\$12,122,744	2%	33	1%	\$3,156,043	1%	\$12,020,283	3%	99%	\$5,369,196
313-33	Other Manufacturing	\$38,780,888	7%	85	3%	\$11,363,647	3%	\$34,931,604	9%	90%	\$12,926,715
42	Wholesale Trade	\$16,276,192	3%	90	3%	\$10,696,776	3%	\$1,470,195	0%	9%	(\$2,660,137)
44-45	Retail Trade	\$8,913,970	2%	133	5%	\$7,497,069	2%	\$351,638	0%	4%	(\$612,420)
48-49	Transportation & Warehousing	\$8,077,966	1%	60	2%	\$3,839,621	1%	\$1,510,979	0%	19%	(\$1,814,112)
51-56	Professional & Business Services	\$42,386,343	7%	299	10%	\$28,039,467	8%	\$11,865,005	3%	28%	\$2,130,206
51	Information	\$562,116	0%	1	0%	\$143,655	0%	\$121,285	0%	22%	(\$127,772)
52	Finance and Insurance	\$9,112,894	2%	42	1%	\$5,244,333	1%	\$2,622,234	1%	29%	(\$85,149)
53	Real Estate and Rental & Leasing	\$16,432,410	3%	104	4%	\$12,275,128	3%	\$1,052,131	0%	6%	(\$1,270,775)
54	Professional, Scientific, and Technical Services	\$13,463,544	2%	118	4%	\$8,755,071	2%	\$8,017,993	2%	60%	\$4,506,581
55	Management of Companies and Enterprises	\$496,152	0%	3	0.1%	\$295,061	0%	\$46,981	0%	9%	(\$111,549)
56	Admin and Support, Waste Mgmt, Remediation	\$2,319,227	0%	30	1%	\$1,326,219	0%	\$4,381	0%	0%	(\$781,130)
61	Educational Services	\$1,215,342	0%	34	1%	\$753,965	0%	\$109,969	0%	9%	(\$157,406)
62	Health Care and Social Assistance	\$1,879,084	0%	14	0%	\$1,223,666	0%	\$6	0%	0%	(\$466,562)
71	Arts, Entertainment, and Recreation	\$5,108,991	1%	51	2%	\$3,358,488	1%	\$2,642,086	1%	52%	\$1,335,428
72	Accommodation and Food Services	\$17,505,435	3%	240	8%	\$9,244,026	3%	\$7,537,954	2%	43%	\$1,828,341
81	Other Services (except Public Administration)	\$10,758,456	2%	141	5%	\$6,600,745	2%	\$7,013,838	2%	65%	\$3,789,501
92	Public Administration	\$65,370,786	11%	801	27%	\$64,209,793	17%	\$14,565,439	4%	22%	\$13,691,139
	Subtotal Industry Sectors	\$549,389,989	94%	2,942	100%	\$347,997,867	94%	\$372,222,453	99%	68%	\$222,397,562
	Imputed Rental Activity for Owner-occupied Dwellings	\$32,083,664	6%	0	0%	\$21,603,490	6%	\$2,347,584	1%	7%	(\$4,841,105)
	Unclassified sectors ²	\$0	0%	0	0%	\$0	0%	\$0	0%	-	\$0
	Total	\$581,473,653	100%	2,942	100%	\$369,601,357	100%	\$374,570,037	100%	64%	\$217,556,457

[1] Sacramento River Corridor as defined by the following USPS zip codes: 95612, 95615, 95639, 95641, 95680, 95686, 95690.

[2] Includes: used and secondhand goods, scrap, rest of the world adjustments, and noncomparable foreign imports.

Source: IMPLAN 2009 Zip Code Data; and Economic & Planning Systems.

Legend

- Legal Zone
- Primary Zone
- Zip Code boundary
- County boundary
- Water

Yolo County

Sacramento County

Solano County

San Joaquin County

Contra Costa County

Alameda County

Stanislaus County

Source: Scan/US Inc., 2010 ZIPs, and US Census 2009 Tiger/Line Files.

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Table B-27 Legal Delta Industry Analysis [1]

NAICS Code	Industry Sector	Output		Employment		Gross Regional Product		Total Industry Exports		Exports as a % of Output
		(Revenues/Sales)	%	Amount	%	Amount	%	Amount	%	
11	Agriculture, Forestry, Fishing & Hunting	\$701,339,145	2%	5,367	2%	\$319,256,513	2%	\$468,520,482	4%	67%
21	Mining, including Oil & Gas Extraction	\$60,798,982	0%	240	0%	\$32,601,416	0%	\$34,723,500	0%	57%
22	Utilities	\$2,235,858,536	6%	1,784	1%	\$1,072,500,776	5%	\$1,281,985,506	11%	57%
23	Construction	\$2,350,212,248	7%	15,781	7%	\$1,234,267,683	6%	\$687,338,602	6%	29%
31-33	Manufacturing	\$7,387,285,566	21%	14,007	6%	\$1,823,377,797	9%	\$5,580,376,054	48%	76%
311-2	Food & Beverage Manufacturing	\$2,644,019,252	7%	3,183	1%	\$515,269,024	3%	\$1,983,374,712	17%	75%
313-33	Other Manufacturing	\$4,743,266,315	13%	10,825	5%	\$1,308,108,773	7%	\$3,597,001,342	31%	76%
42	Wholesale Trade	\$1,643,072,896	5%	9,178	4%	\$1,079,512,512	5%	\$148,415,390	1%	9%
44-45	Retail Trade	\$1,898,418,180	5%	28,193	12%	\$1,601,838,259	8%	\$229,247,482	2%	12%
48-49	Transportation & Warehousing	\$2,087,725,573	6%	15,568	7%	\$1,199,010,775	6%	\$1,146,722,302	10%	55%
51-56	Professional & Business Services	\$6,143,956,462	17%	43,974	19%	\$3,934,730,883	20%	\$1,259,381,936	11%	20%
51	Information	\$764,991,164	2%	2,210	1%	\$378,270,229	2%	\$230,140,017	2%	30%
52	Finance and Insurance	\$1,497,288,936	4%	6,722	3%	\$835,332,461	4%	\$129,959,213	1%	9%
53	Real Estate and Rental & Leasing	\$1,975,174,027	6%	11,936	5%	\$1,447,290,270	7%	\$646,199,541	6%	33%
54	Professional, Scientific, and Technical Services	\$968,828,679	3%	9,067	4%	\$658,200,800	3%	\$65,810,421	1%	7%
55	Management of Companies and Enterprises	\$141,799,520	0%	784	0.3%	\$86,080,533	0%	\$13,427,051	0%	9%
56	Admin and Support, Waste Mgmt, Remediation	\$795,874,137	2%	13,255	6%	\$529,556,590	3%	\$173,845,693	1%	22%
61	Educational Services	\$344,225,128	1%	5,589	2%	\$195,301,744	1%	\$1,355,531	0%	0%
62	Health Care and Social Assistance	\$2,371,267,128	7%	24,615	10%	\$1,473,027,786	7%	\$52,842,109	0%	2%
71	Arts, Entertainment, and Recreation	\$155,756,948	0%	2,928	1%	\$96,619,387	0%	\$1,685,124	0%	1%
72	Accommodation and Food Services	\$1,026,191,484	3%	16,578	7%	\$550,833,619	3%	\$2,648,825	0%	0%
81	Other Services (except Public Administration)	\$1,040,243,946	3%	16,653	7%	\$629,326,692	3%	\$250,368,096	2%	24%
92	Public Administration	\$3,262,780,256	9%	37,164	16%	\$2,877,442,462	14%	\$141,526,382	1%	4%
Subtotal Industry Sectors		\$32,709,132,479	92%	237,619	100%	\$18,119,648,304	90%	\$11,287,137,321	97%	35%
Imputed Rental Activity for Owner-occupied Dwellings		\$2,893,810,688	8%	0	0%	\$1,948,542,999	10%	\$359,273,926	3%	12%
Unclassified sectors ²		\$0	0%	0	0%	\$0	0%	\$0	0%	-
Total		\$35,602,943,167	100%	237,619	100%	\$20,068,191,303	100%	\$11,646,411,247	100%	33%

[1] Legal Delta region as defined by the following USPS zip codes: 94505, 94509, 94511, 94513, 94514, 94548, 94561, 94565, 94571, 95203, 95204, 95206, 95207, 95219, 95234, 95242, 95304, 95330, 95612, 95615, 95639, 95641, 95680, 95686, 95690, 95691, 95831, 95832.

[2] Includes: used and secondhand goods, scrap, rest of the world adjustments, and noncomparable foreign imports.

Source: IMPLAN 2009 Zip Code Data; and Economic & Planning Systems.

Table B-28 Location Quotient Analysis of Gross Regional Product in the Legal Delta vs. California

Industry (NAICS)	Legal Delta		California		Legal Delta LQ [1]	
	GRP [2]	% of Total (a)	GRP [2]	% of Total (b)	LQ (c) = (a) / (b)	Rank
Agriculture, Forestry, Fishing & Hunting	\$319,256,513	1.6%	\$22,143,538,853	1.2%	1.35	5
Mining, including Oil & Gas Extraction	\$32,601,416	0.2%	\$9,097,421,206	0.5%	0.33	18
Utilities	\$1,072,500,776	5.3%	\$36,349,135,744	1.9%	2.76	1
Construction	\$1,234,267,683	6.2%	\$73,580,133,120	3.9%	1.57	4
Manufacturing	\$1,823,377,797	9.1%	\$210,033,169,698	11.2%	0.81	15
Wholesale Trade	\$1,079,512,512	5.4%	\$96,565,780,480	5.2%	1.04	11
Retail Trade	\$1,601,838,259	8.0%	\$115,112,508,928	6.1%	1.30	6
Transportation & Warehousing	\$1,199,010,775	6.0%	\$47,683,479,680	2.5%	2.35	2
Information	\$378,270,229	1.9%	\$114,550,339,840	6.1%	0.31	21
Finance and Insurance	\$835,332,461	4.2%	\$130,284,809,216	7.0%	0.60	16
Real Estate and Rental & Leasing	\$1,447,290,270	7.2%	\$165,021,711,552	8.8%	0.82	14
Professional, Scientific, and Technical Services	\$658,200,800	3.3%	\$166,132,451,712	8.9%	0.37	17
Management of Companies and Enterprises	\$86,080,533	0.4%	\$26,030,657,536	1.4%	0.31	20
Admin and Support, Waste Mgmt, Remediation	\$529,556,590	2.6%	\$54,498,784,448	2.9%	0.91	13
Educational Services	\$195,301,744	1.0%	\$16,740,023,296	0.9%	1.09	10
Health Care and Social Assistance	\$1,473,027,786	7.3%	\$117,324,489,984	6.3%	1.17	7
Arts, Entertainment, and Recreation	\$96,619,387	0.5%	\$28,981,888,432	1.5%	0.31	19
Accommodation and Food Services	\$550,833,619	2.7%	\$52,815,414,976	2.8%	0.97	12
Other Services (except Public Administration)	\$629,326,692	3.1%	\$52,228,386,816	2.8%	1.13	9
Public Administration	\$2,877,442,462	14.3%	\$229,862,935,360	12.3%	1.17	8
Imputed Rental Activity for Owner-occupied Dwellings	\$1,948,542,999	9.7%	\$109,525,106,688	5.8%	1.66	3

[1] LQ (Location Quotient): The ratio of the share of gross regional product in a specific industry locally to the share of gross regional in the same industry regionally.

[2] Gross Regional Product (GRP) estimates from IMPLAN.

Source: IMPLAN

Appendix C Photographs of Delta Levees (Chapter 5)

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Figure C-1 Sacramento River south of Courtland, showing repair of erosion using rip-rap



Figure C-2 - Merritt Island, showing repair of erosion site using vegetation



Figure C-3 - Sutter Slough, showing natural vegetation on levees



Figure C-4 - Sargent-Barnhart Tract, with Brookside Subdivision mansions behind levee



Figure C-5 - McDonald Island, with PG&E gas storage facilities behind levee



Figure C-6 - Mildred Island, showing effect of flooding on levee



Figure C-7 - Upper Jones Tract, showing repair of 2004 breach with eco-bench



Figure C-8 - Byron Tract, showing stepped seismically-resistant levee



Figure C-9 - McDonald Island, showing PL 85-99 berm on landside



Figure C-10 - Steamboat Slough



Appendix D: Other Special Levees (Chapter 5)

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The eight western islands and tracts have been identified by the State as being critical to water quality in the Delta as they provide a buffer against saltwater intrusion. Their importance will increase if sea level rises at a faster rate. These islands are identified in Figure D1.

LEGEND

- Primary
- Secondary
- County Lines
- City Limits
- Interstates/Highways
- 8 Western Islands

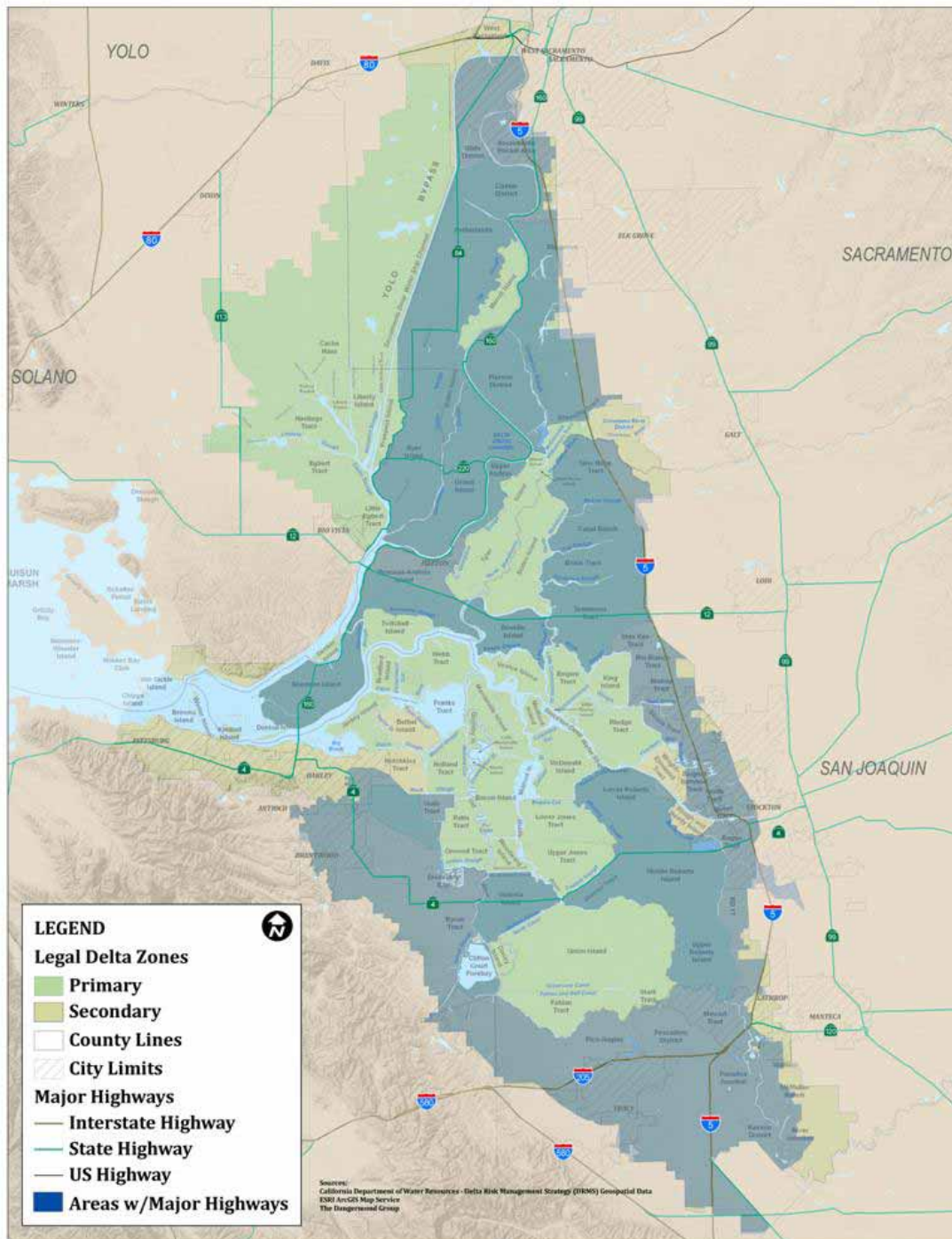
Sources:
 California Department of Water Resources - Delta Risk Management Strategy (DRMS) Geospatial Data
 ESRI ArcGIS Map Service
 The Designated Survey

Economic Sustainability Plan for the Sacramento-San Joaquin Delta

Levees that Protect Major Highways

The islands that include major highways that are protected by levees are shown in Figure D2.

Figure D2 Islands with Major Highways²

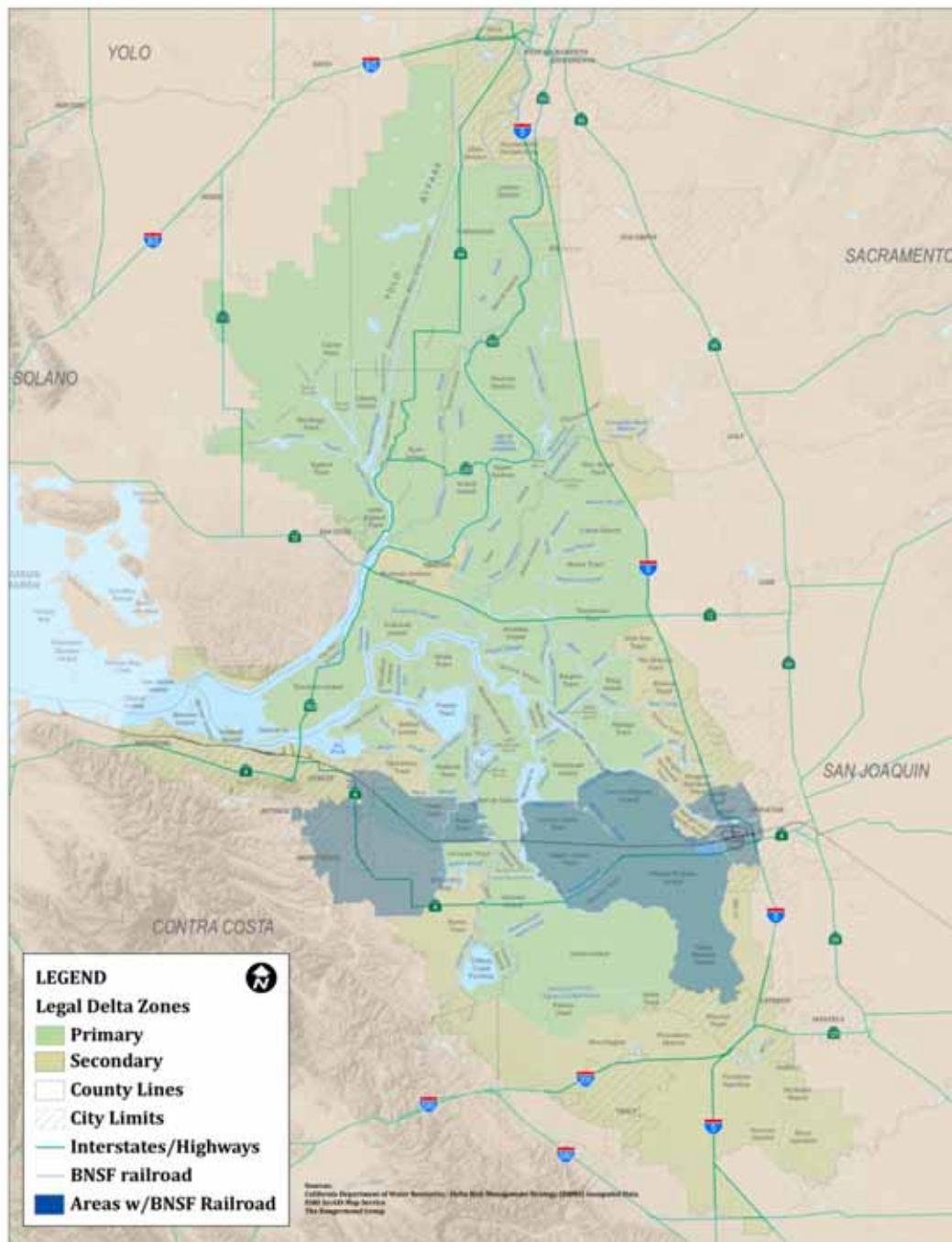


² Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees that Protect the BNSF Railway

The islands crossed by the Burlington Northern Santa Fe railway are shown in Figure D3. Although BNSF does not contribute to the maintenance of the levees that protect the railroad, they are suing the State for losses sustained in the 2004 flooding of Upper Jones Tract.

Figure D3 Islands that house the BNSF Railroad³

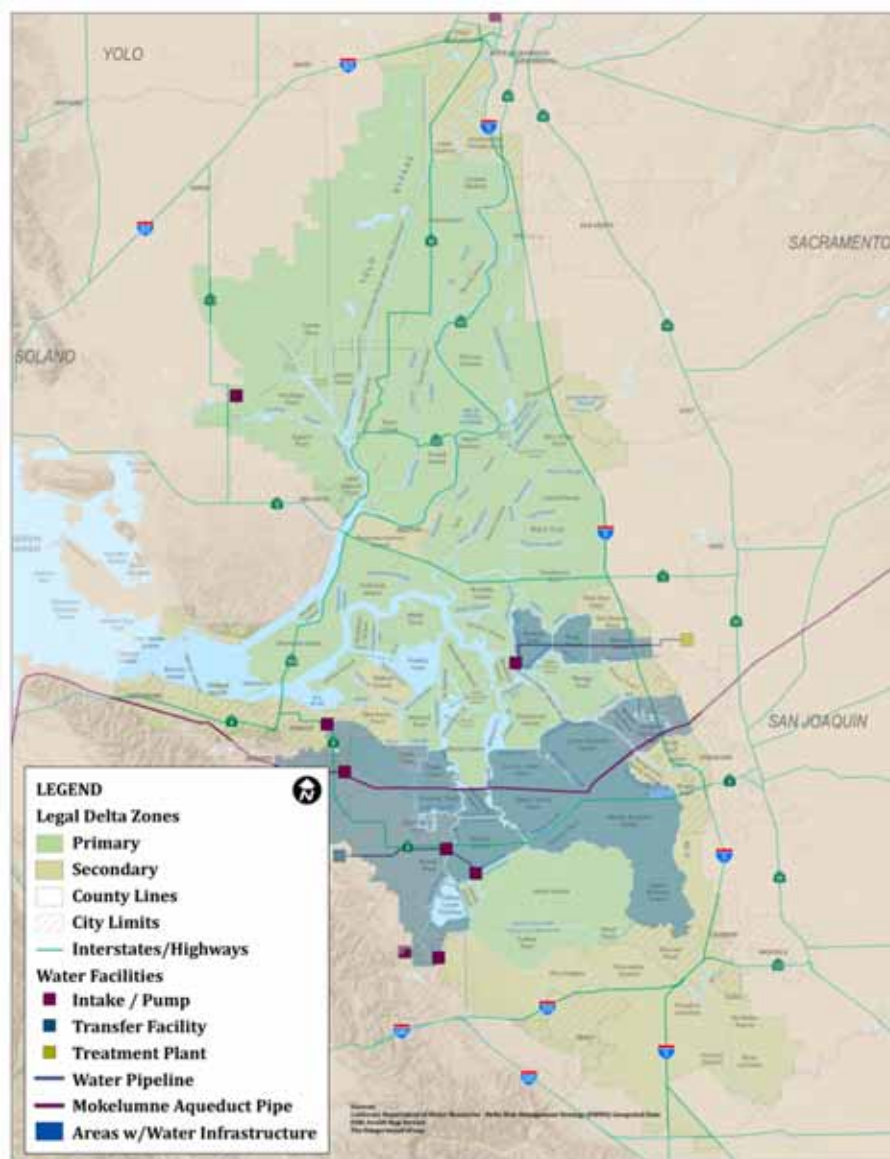


³ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees that Protect Water Supply Pumping Plants and Pipelines

The islands that house water supply pumping plants and pipelines are shown in Figure D4. These include the Mokelumne Aqueduct of East Bay Municipal Utility District (EBMUD), the Contra Costa Water District pumping plants and pipelines, the Solano County Water Agency Barker Slough intake, the new City of Stockton intake and pipeline, and the Banks and Jones pumping plants of the State Water Project and the Central Valley Project. EBMUD makes annual contributions to the reclamation districts that protect the Mokelumne Aqueduct and was instrumental in securing \$35 million of bond funding being earmarked for the improvement of levees that protect the aqueduct.

Figure D4 Islands that House Water Supply Pumping Plants and Pipelines⁴

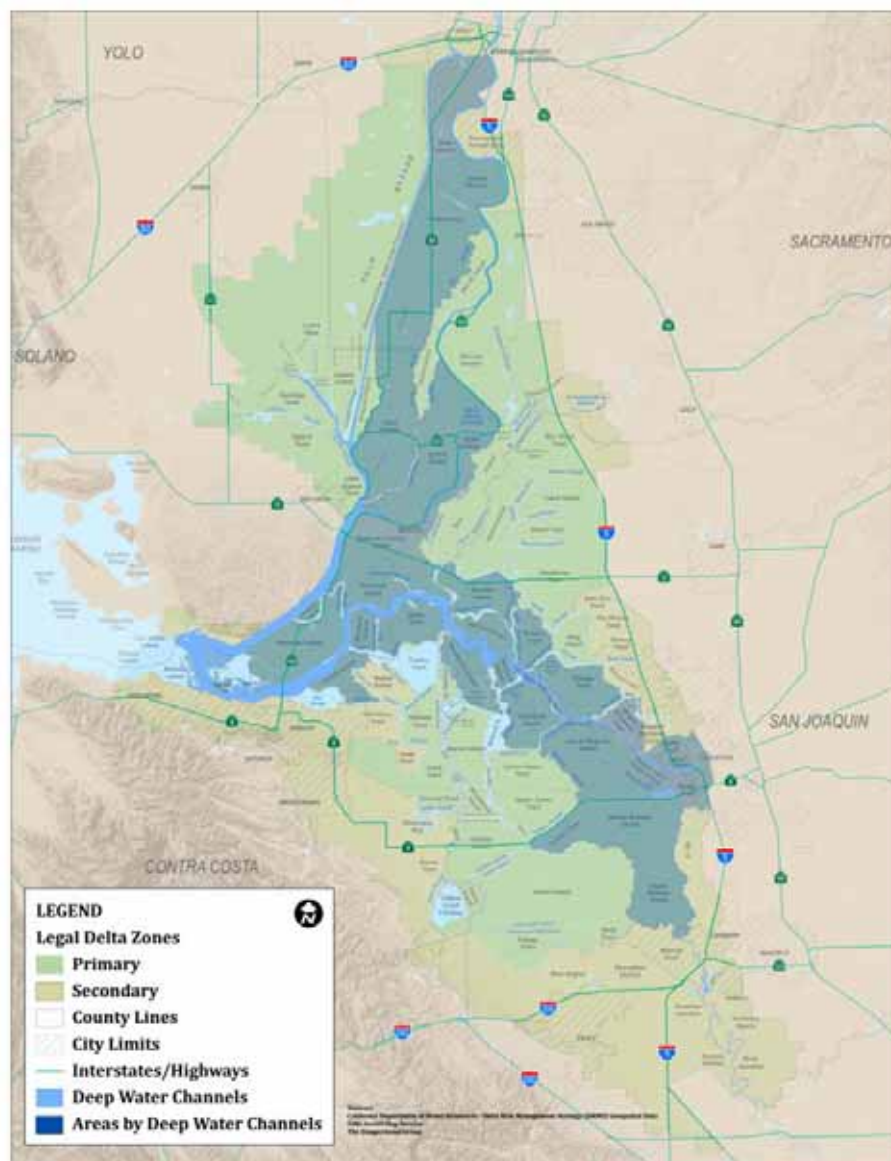


⁴ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees Bordering the Deep-water Ship Channels

Although the deep-water ship channels to the Ports of Stockton and West Sacramento have some negative effects on the Delta ecosystem because they foster salinity intrusion and the introduction of non-native species, they also make important contributions to the environment and the economy. They help reduce truck traffic through and around the Delta and improve air quality, and are local economic drivers for West Sacramento and Stockton. The islands that form the borders of the deep-water ship channels are shown in Figure D5. Maintenance of the levees surrounding these islands is critical to maintaining the ship channels. Without these levees the ship channels would tend to silt up, and shipping would be exposed to rougher water.

Figure D5 Islands Bordering the Deep-water Ships Canals⁵

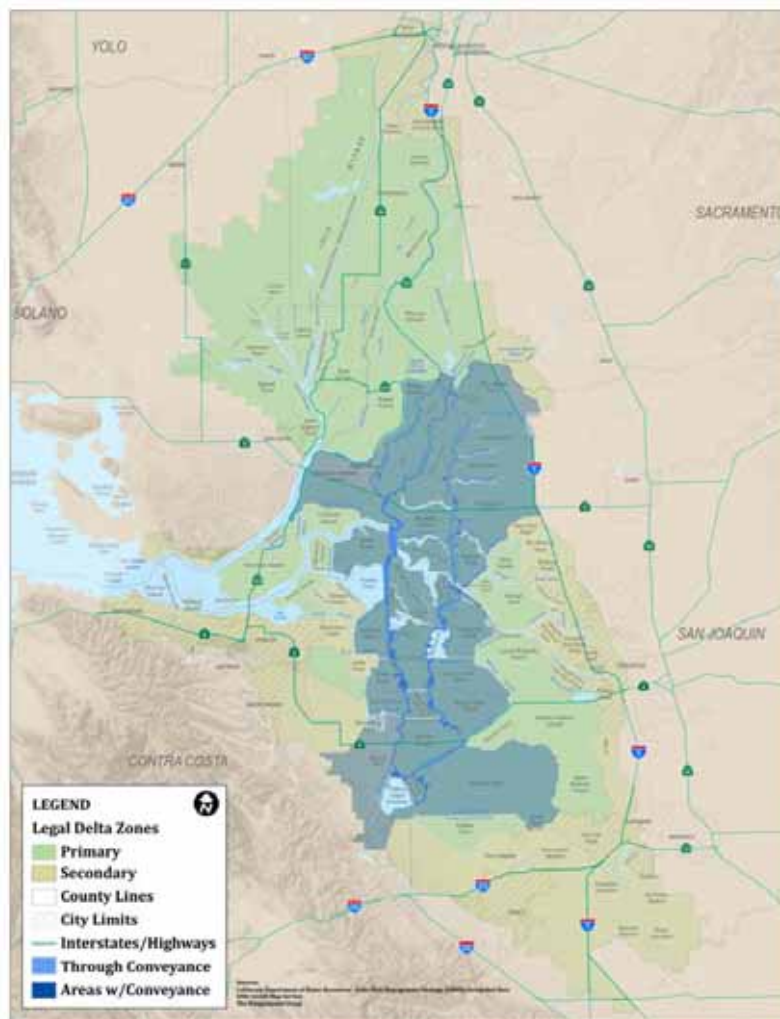


⁵ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees Bordering the Principal Paths for Through-Delta Water Conveyance

Starting at the Delta Cross Canal, just north of Walnut Grove, there are two principal paths for the conveyance of water from the Sacramento River to the export pumps in the south Delta—one basically follows the North Fork Mokelumne River and then the Old River, and the other follows the South Fork Mokelumne and then Middle River. A third initial path is provided by Georgiana Slough which then joins up with the Old River path. As presently planned, there would continue to be some through-Delta conveyance even after the completion of the new north Delta intakes envisioned by the Bay Delta Conservation Plan (BDCP); if they are constructed, new conveyance facilities will not be completed for many years. Maintenance of the levees adjacent to these conveyance paths is therefore very important and the water exporters and DWR have undertaken various studies to improve them and/or restore them as quickly as possible following any disruption. The islands adjacent to these conveyance paths are shown in Figure D6.

Figure D6 Islands Bordering the Principal Paths for Through-Delta Water Conveyance⁶

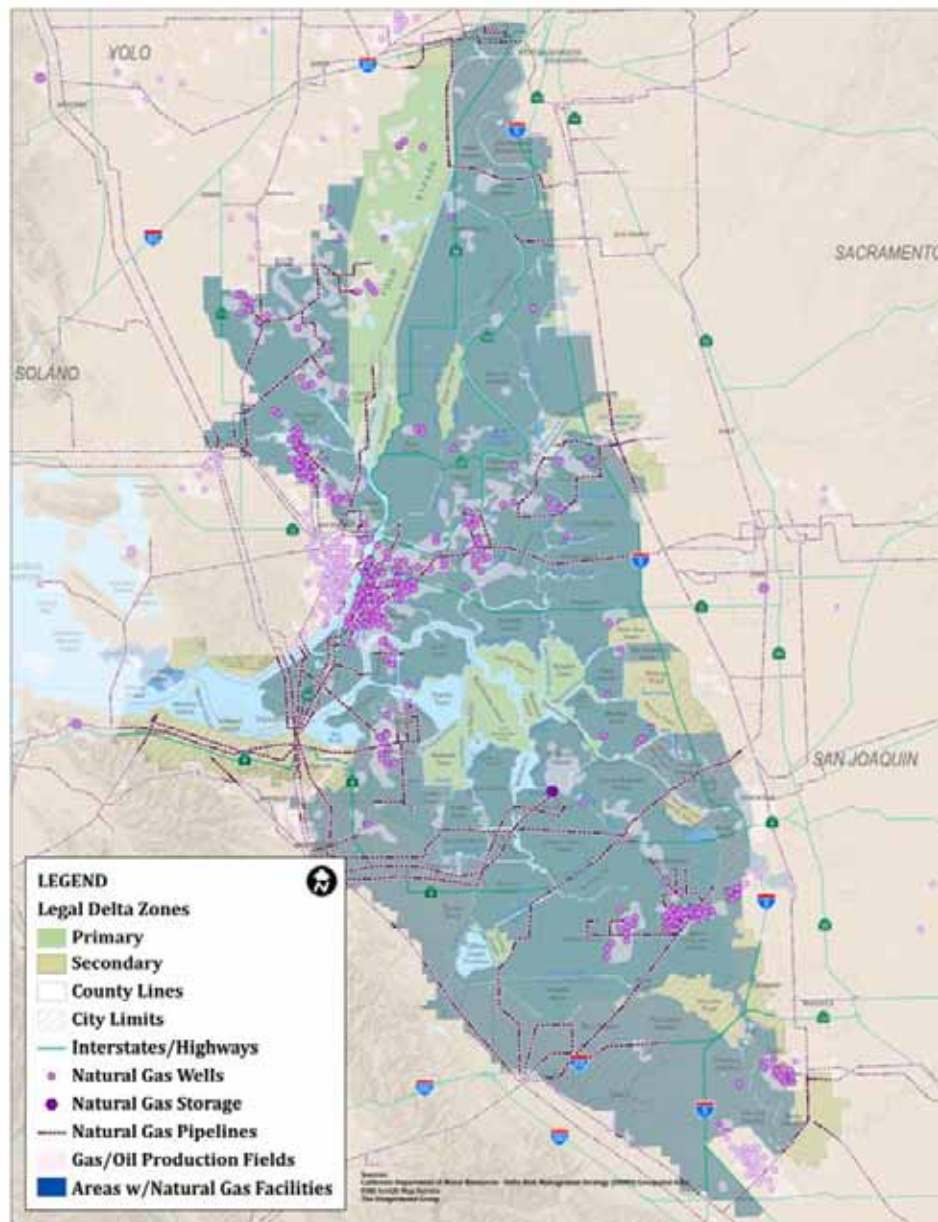


⁶ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees Protecting Natural Gas Production and Storage Facilities and Pipelines

The islands housing natural gas production and storage facilities and pipelines are shown in Figure D7. The facility of most significance is the PG&E storage facility on McDonald Island. PG&E contributes 90 percent of the funds to the local reclamation district and has been committed to maintaining superior levees around the island since a failure occurred in 1982.

Figure D7 Islands Housing Natural Gas Production and Storage Facilities and Pipelines⁷

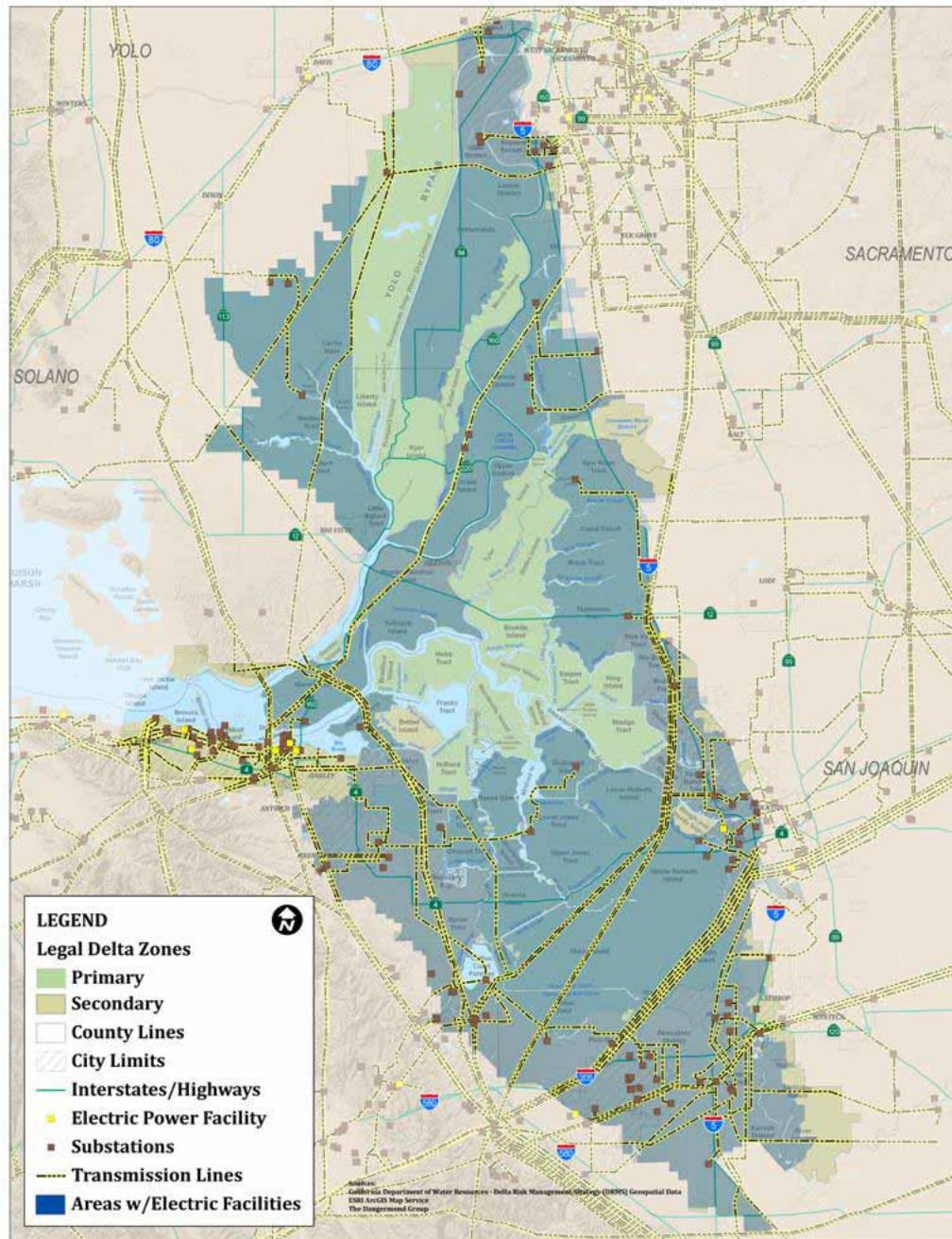


⁷ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees Protecting Electric Power Transmission Lines and Substations

The islands that are crossed by electric power transmission lines or that house major substations are shown in Figure D8. Of perhaps equal importance are fiber-optic communication cables, but their locations are proprietary and they are not shown.

Figure D8 Islands Housing Electric Power Transmission Lines and Substations⁸

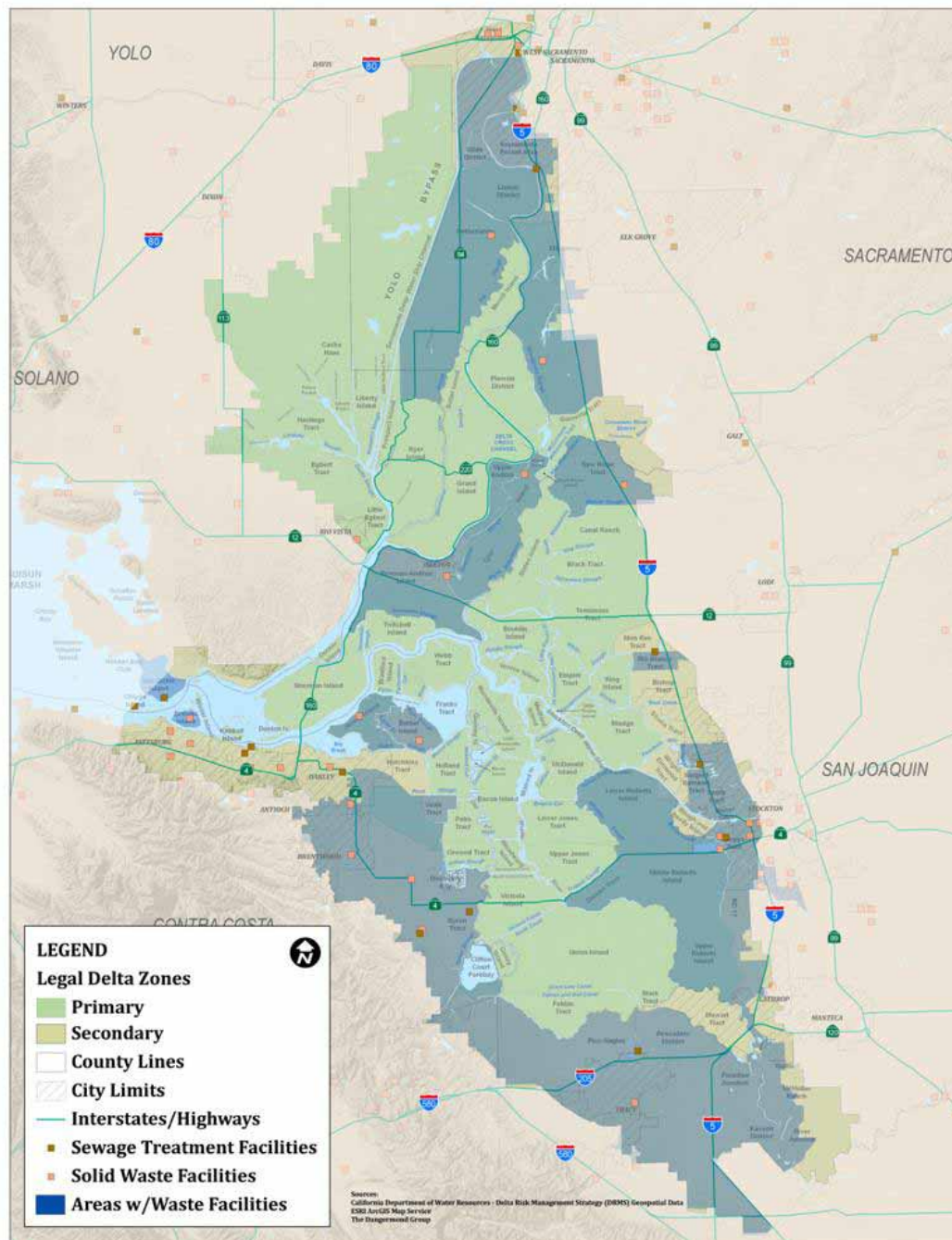


⁸ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees that Protect Waste Disposal Facilities

The islands that contain sewage treatment plants and solid waste disposal facilities are shown in Figure D9.

Figure D9 Islands Housing Sewage Treatment Plants⁹

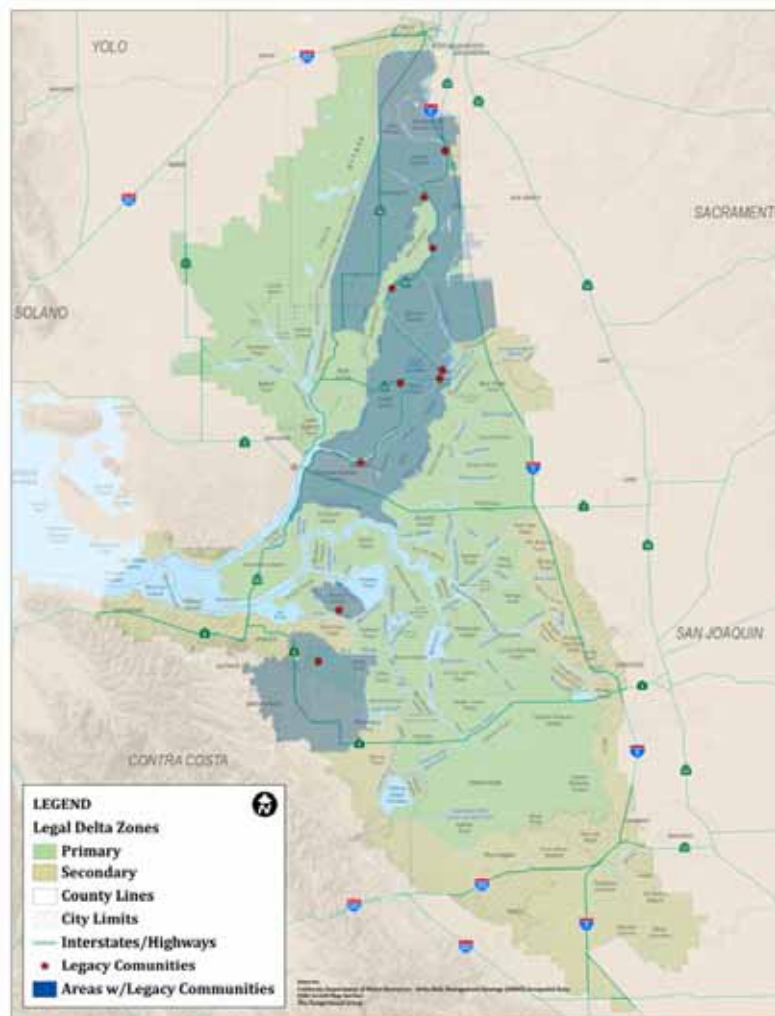


⁹ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Levees that Protect Legacy Communities

The islands that contain Legacy Communities are shown in Figure D10. Flood protection for Legacy Communities in the Delta involves several special considerations. The Legacy Communities are primarily, but not exclusively, protected by project levees that exceed the PL 84-99 geometric standard. However, all these towns have either been or are in the process of being remapped into the 100-year floodplain by FEMA. Having a levee system certified is not based on meeting the PL 84-99 levee standard, but instead is based on meeting the requirements of Section 65.10 of the National Flood Insurance Program (NFIP). These regulations must be met in order to be mapped outside the floodplain and include a multiple criteria which require a level of engineering analysis that far exceeds typical reclamation district budgets. Thus it appears that flood insurance costs in the Legacy Communities will rise dramatically, and that this will discourage growth and investment in the Legacy Communities unless special measures are taken.

Figure D10 Islands Containing Legacy Communities¹⁰



¹⁰ Locations of infrastructure have been generally been obtained from the DRMS GIS data set developed by URS Corporation and provided by DWR. For high resolution image see: <http://forecast.pacific.edu/desp-figs.html>

Appendix E Clarification of Some Basic Issues with Regard to Delta Levees **(Chapter 5)**

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Variability

Because of their location in the Delta and their history of construction, Delta levees have rather variable foundation conditions and composition. This makes it difficult and expensive to conduct detailed geotechnical engineering investigations and analyses. Although the DRMS Phase 1 report refers to a large number of soil borings that have been conducted, most of these are older borings that have limited value with respect to engineering properties because insufficient testing was carried out. While the lack of hard engineering data on the properties of the levees is problematic, the levee system has, in fact, been proof loaded for 100 years or more. The “observational method” is a well-recognized procedure in geotechnical engineering and is particularly applicable to uncertain foundation condition and variable material properties. The history of the Delta levees shows that although there were many levee failures in earlier years, the majority of those resulted from overtopping. Improved flood management, in addition to other improvements in the levees, has significantly reduced the rate of failure. Today’s levees, which retain water 24 hours a day, have demonstrated an ability to withstand normal tidal and typical flood loadings regardless of their variability. While there is seepage through these levees, it is acceptable as long as the seepage is controlled. Another basic principle in geotechnical engineering is, “You don’t need to stop all seepage, you just need to control the seepage.”

One of the variables associated with Delta levees is the depth of peat. The depth of peat under the levees is not necessarily the same as the depth of peat that remains in the center of the islands. This second number is now much lower as a result of loss of peat due to oxidation and erosion. However, the loss of peat under the levees themselves has been limited.

While there is great variation in “typical” Delta levees, the cross section of the existing levee on Webb Tract shown in Figure 4.19 is likely typical of many levees in the western and central Delta where the manmade levees are not constructed over natural levees and the height of the levee as seen from the land side is the result of subsidence of the land surface rather than the building up of the levees. As can be seen in this cross section, the levee is actually composed largely of peat rather than fill. That is both good and bad. As discussed below, it is good because peat is not susceptible to liquefaction and might be expected to perform well in earthquakes; however, peat is relatively weak and very compressible, so that placement of any additional fill must be handled very carefully. The other two kinds of levee section that might be referred to as typical apply to those levees built on top of natural levees, as shown in Mount and Twiss (2005),¹ and those levees in the north and south Delta that generally consist of more sandy materials constructed on sandy foundations. The depositional history and geology of the sands that underlie the Delta has been studied in detail by Shlemon and Begg (1972)² and Atwater (1982).³ While they are variable in origin, these sands generally provide a good foundation for any structures that they support. The common suggestion that Delta levees are founded on poor materials or “quicksand” is less than accurate.

¹ Mount, J.F. and R. Twiss, “Subsidence, sea level rise, seismicity in the Sacramento-San Joaquin Delta,” *San Francisco Estuary and Watershed Science* v. 3, article 5 (2005).

² Shlemon, R.J. and E.L. Begg, “Late Quaternary evolution of the Sacramento-San Joaquin Delta, California,” *Quaternary Studies* 13 (1975): 259-266.

³ Atwater, B., *Geologic Maps of the Sacramento-San Joaquin Delta, California*, USGS Miscellaneous Field Studies Map MF-1401, 1982.

Vulnerability to tides and floods

Delta levees are vulnerable to more extreme tides and floods and particularly adverse combinations of these two loadings. There were no significant Delta levee failures in the 1997 flood, said to be a 100-year or greater flood; however, widespread failure of levees upstream from Stockton reduced the maximum water surface elevations in the Delta. But, this type of relief should also be component of a planned flood management system so that there is a limit to the hazard posed not only to Delta levees but to the levees protecting Sacramento and Stockton as well. High water elevations resulting from tides and floods can also be seen days or weeks in advance so that appropriate emergency measures can be taken. The probabilities of failure due to overtopping that are calculated in DRMS appear to be inconsistent with these realities. However, designing for only 100-year floods appears to be inadequate given the value of the resources protected by the Delta levees and estimates of maximum water surface elevations in the Delta have not been updated for some years. These estimates need to be updated and provided for longer mean recurrence intervals as soon as possible without necessarily waiting for the 2017 update of the Central Valley Flood Protection Plan. Additionally, peak flows into the Delta could be further controlled and limited by the reactivation of floodplains upstream of the Delta and by the construction of additional flood bypasses, such as the proposed Lower San Joaquin River Flood Bypass, and these possibilities should be considered in association with updating the estimates of maximum water surface elevations.

Impacts of subsidence and sea-level rise

Land subsidence in the Delta is real, but its continuing significance is often overstated. The historic subsidence due to oxidation and erosion of the peat has been well-documented by Mount and Twiss. As noted by Mount and Twiss, the post-1950 subsidence rates were reduced by 20 to 40 percent from early rates as a result of better farming practices. Although they recognized that subsidence rates will slow further due to depletion of organic material and the continuation of better land use practices, they still used the upper bound of this range in making projections going forward to 2050. Interpretation of the 2007 DWR LiDAR data by MBK Engineers, as reported in comments to the Delta Stewardship Council by the Central Valley Flood Control Association (2011),⁴ suggest that over the last 30 years little if any subsidence has occurred in areas that are currently higher than 10 feet below sea level. In fact, problems associated with subsidence, such as impaired drainage, are only occurring on lands currently below 12 to 15 feet below sea level. MBK's studies indicate that only about 96,000 acres, or 14 percent of the area of the Delta, lies below minus 12 feet and that only 57,000 acres, or 8 percent of the total area, lies below minus 15 feet. These figures suggest that continued subsidence is not a Delta-wide problem.

Subsidence of even several additional feet has relatively little impact on the stability and seepage issues associated with levees that are already 20 to 30 feet high on the land side. Likewise, although sea-level rise of 5 feet would have some impact on the stability and seepage issues associated with the current levees, it would have little consequence for levees improved to the suggested Delta standard and even less consequence for sea-level rise that is consistent with the probability of occurrence of the water surface elevations and earthquake loadings for which these levees will be designed.

⁴ California Central Valley Flood Control Association, Comments on Flood Risk White Paper, Delta Stewardship Council, January 2011.
http://www.deltacouncil.ca.gov/sites/default/files/documents/files/CVFCA_012011_0.pdf

Vulnerability to earthquakes

Delta levees also have some vulnerability to earthquakes but coverage in popular media and discussion in political debates has often overstated the risk of earthquake-induced levee failure and regrettably this kind of overstatement was echoed in the Delta Stewardship Council's Flood Risk White Paper.⁵ However, the seismic risk portion of DRMS was relatively well done and the results shown in Figure 5.14 of the White Paper can serve as a useful starting point for an intelligent discussion of earthquake-induced failure of levees. This figure indicates that the 100-year return period peak ground acceleration (pga) in the Delta ranges from 0.1 to 0.2g in firm soils. The phenomenon of liquefaction is generally cited as the greatest contributor to the hazard faced by the Delta levees, and this level of acceleration is lower than that which has been observed to trigger liquefaction in hydraulically-placed dams and sand fills. The examples of liquefaction-induced failures that are shown in Figures 5.8 to 5.13 are not applicable to the Delta because the subsurface conditions in the Delta are unique and unlike those of the case histories shown in these figures.

There are three different situations where loose sands that may be susceptible to liquefaction are found in and under the Delta levees. One possible source of loose sands is the natural levees that underlie some of the present-day levees. The extent of this condition is believed to be limited, as discussed previously. The second possible source of sands that may be susceptible to liquefaction is hydraulically placed clean sand that has been dredged from the main river channels and placed in adjacent levees without compaction. The actual extent of these materials is unclear and it may be that these materials are sufficiently well drained that most of the excess pore pressures that are generated by earthquake shaking would quickly dissipate so that any deformations would be limited. The third source is the topmost sand layer that underlies the peat. As noted previously, from a geotechnical engineering point of view, the sands that underlie the Delta can, with the possible exception of the top 10 feet, be characterized as dense to very dense, and actually constitute a good foundation. Meticulous work by Drexler et al. (2009)⁶ indicates that the oldest peat deposits are in the order of 7,000 years old so that the underlying sands are at least this old. That age, when combined with the penetration resistances cited by Hultgren-Tillis Engineers in their report on Webb Tract,⁷ suggest that even the surficial sands are not particularly susceptible to liquefaction. Even under the 500-year return period ground motions estimated in DRMS, which range from 0.2 to 0.4g in firm soils, significant or widespread deformations from any of these three kinds of sands should not be expected. The repeated citing of levee deformations that were sustained in the Kobe and Christchurch earthquakes, which had higher ground motions and where levees were founded on very loose and recent alluvial soils, is not particularly helpful. However, although these case histories are not directly applicable to the Delta, they do illustrate that levees do not necessarily breach and release water, even when they are quite badly deformed. In fact, to the extent that the Delta levees are largely composed of peat, they may be expected to perform better than levees in general under earthquake loadings. Because of the unusual fibrous nature of peat, not only is it expected not to lose strength under earthquake loadings,⁸ but it also might be expected

⁵ Delta Stewardship Council, Flood Risk White Paper, 2010, <http://deltacouncil.ca.gov/delta-plan>

⁶ Drexler, J.Z., C.S. de Fontaine and T.A. Brown, "Peat Accretion Histories During the Past 6,000 Years in Marshes of the Sacramento-San Joaquin Delta, CA, USA," *Estuaries and Coasts* 32 (2009): 871–892.

⁷ Hultgren-Tillis Engineers, Geotechnical Evaluation, Seismically Repairable Levee, Webb Tract, Report to Reclamation District 2026, December 2009.

⁸ Boulanger, R. W., Arulnathan, R., Harder, L. F., Jr., Torres, R. A., and Driller, M. W., "Dynamic properties of Sherman Island peat," *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 124(1) (1998):12-20; and Kishida, T., Wehling, T. M., Boulanger, R. W., Driller, M. W., and Stokoe, K. H.,

to attenuate ground motions with peak accelerations in the order of 0.2g or more. The relatively good performance of peat under even large amplitude cyclic loadings was demonstrated by a recent test carried out on Sherman Island by researchers from UCLA with funding from the National Science Foundation's NEES program.⁹ Thus, a fair summary would be that the risk of failure of Delta levees due to earthquake shaking cannot be dismissed, but that more detailed studies are required to determine whether it even rises to significant levels.

Sunny-day failures

As with floods and earthquakes, the real risk of "sunny-day" failures has been overstated. The Flood Risk White Paper prepared for the Delta Stewardship Council again cites numbers from DRMS even though the IRP cautioned against taking DRMS numbers at face value. There have been three major "sunny day" failures in the last 30 years: the 1980 failure of Lower Jones Tract, the 1982 failure of McDonald Island, and the 2004 failure of Upper Jones Tract. While at first blush this is not inconsistent with the DRMS estimate of one failure every 10 years, the first two of these resulted from operation of the PG&E gas storage facility under McDonald Island. Thus, the true rate of sunny-day failures due to unknown causes is less than once every 30 years. Improvements in systems for monitoring the internal condition of levees, as discussed in Section 3.2, should allow more prompt discovery of dangerous conditions in the future and further reduce the probability of sunny-day failures.

Summation of failure mechanisms

As suggested by the discussion in the previous paragraphs, there are a number of factors that make it very difficult to precisely quantify the probabilities of single or multiple levee breaches in a given window.

The first of these factors is the variability of the existing levee system. It is not possible to accurately and meaningfully calculate the fragilities that are needed to develop a formal risk analysis without undertaking an exhaustive investigation of the existing levees. The time and money that would have to be expended on such investigations can be better spent by proceeding immediately with common-sense solutions.

The second factor is that a levee is not necessarily breached when the design flood is exceeded. Improvements to Delta levees are currently designed to accommodate water surface elevations resulting from a combination of tides and flooding that have a mean recurrence interval of 100 years, that is, a 100-year flood. These designs typically provide 1 foot of freeboard above that water surface elevation. But that does not mean that the levees in question might be expected to fail one in every 100 years, or that they have an annual probability of failure of 1 percent. It is likely lower than that, although it could in some circumstances be greater. If the 100-year water surface elevation is predicted correctly, and one assumes a simple Poissonian distribution, the probability of that water surface elevation being exceeded in 100 years is actually 63 percent. Current designs usually provide for 1.5 feet of freeboard although the UDLC and newer FEMA requirements are increasing this to 3 feet. If there has been no settlement of the levee crown and there are no waves, overtopping would thus have an even lower probability of occurrence. But since settlement is inevitable and wave action likely, then the real probability of overtopping becomes a function of effective monitoring

II. "Dynamic properties of highly organic soils from Montezuma Slough and Clifton Court," *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 135(4) (2009): 525-532.

⁹ <http://www.nees.ucla.edu/neesri/>

and flood fighting as water surface levels approach the design value. Additionally, a well-designed levee, with well-established vegetation, can withstand some overtopping without a breach occurring. In an idealized world, all the levees would be free of penetrations and low spots and all would be built to consistent elevations. Therefore, theoretically, if one levee overtops, then many levees would overtop and there would be multiple flooded islands. In reality, all levees are not equal. There is a greater chance that the ones with the most defects might be breached, but that can also be minimized by appropriate allocation of flood-fighting resources.

Similar, but greater, uncertainties affect whether there is a levee breach following an earthquake. If a levee is specifically designed for a certain level of loading, the levee does not necessarily fail in the sense that specified deformations are exceeded even if the design level of loading is exceeded. Geotechnical engineering design calculations normally err on the conservative side, so that if a formal design for earthquake loadings has been undertaken, the levee can be expected to deform less than the design anticipates should the design earthquake loading actually occur. Failures occur when there are gross oversights, like completely ignoring earthquake loadings or failure mechanisms, not because the calculations are in error. There is also uncertainty in the accuracy of the design loading itself. But, regardless of the amount of deformation and cracking that occurs under earthquake loadings, the probability of first overtopping and then failure is a complex function of the water surface elevations at the time of the earthquake and when repairs can be implemented. Thus, one of the considerations in the new Urban Levee Design Criteria, which require that if certain provisions are not met, the design has to allow for expeditious repairs. Following an earthquake, it might be possible to implement a variety of temporary measures, as well as permanent repairs. Some of these are discussed in Section 3.2. Such measures represent an extension of conventional flood fighting to cover earthquakes as well.

This discussion leads to the suggestion that rather than trying to calculate precisely the relative risks faced by the various islands in the Delta and using that to prioritize funding, a much greater effort could be made to educate the Delta community and other interested parties as to the real vulnerability of the levees in a qualitative way, rather than a quantitative way, so that appropriate strategies can be developed to manage these risks. A range of possible strategies is discussed in Section 3. It also suggests that the continued use of a standards-based approach is likely more practical and effective than moving to a risk-based approach. To be useful as a planning and design tool, risk-based analyses have to take into account all of the uncertainties in the design and construction of levee improvements, as well as the human and organizational factors involved in flood fighting and emergency response following earthquakes. That is quite a challenge and it is likely that the judgment of experienced engineers on these issues will provide more reliable answers for the foreseeable future. However, risk-based approaches might provide a good tool for evaluating progress in reducing the combined risks to Delta levees. In practice, as well as in academic settings, such analyses can also be helpful in identifying the factors that make the greatest contribution to risk so that measures can be taken to reduce their relative contribution.

Regulatory Issues

In addition to the physical challenges faced in the Delta, there are also man-made challenges that result from excessive bureaucracy and the politics surrounding these issues. Some of these are noted in this section.

Dredging

The Delta was largely created by dredging and for many years maintenance dredging was carried out, which aided flows and navigation as well as provided a source of fill for improving the levees. However, a surfeit of regulations has essentially brought dredging to a halt in the last 10 to 20 years. By some counts as many as 19 separate permits have to be obtained in order to dredge in the Delta. As a result of the additional expense that is generated by this regulatory process, borrowing on land is now the preferred alternative as a source of levee material. However, dredging is still required for maintenance and deepening of the deep-water ship channels. In addition, dredging is likely to be required to maintain some of the other waterways. It could also be used to generate material for selected levee improvements and will definitely be required for the major ecosystem restoration activities that are now planned for the Delta. The Sacramento District, USACE, is presently in the middle of an EIR process for deepening the Sacramento channel to 35 feet and is in a pre-EIR process for deepening the Stockton channel to 40 feet. These projects will generate 20-30 and 40-50 million cubic yards of spoils respectively. The Corps pays for the digging, but the ports are responsible for stockpiling and/or disposal of the dredged material. Historically the ports have charged end-users \$1 per cubic yard for dredged material. If planned in advance, dredged material can be moved hydraulically at low cost for up to about 8 miles from the point of dredging. The water quality associated with this material is actually quite good and is in fact better than the water quality under the islands, which is adversely affected by the presence of the peat. In addition to the possible use for reclaiming flooded islands or improving levees, this dredged material, if spread out over agricultural land, would both slow the loss of peat and improve water quality. USACE and other agencies are also embarked on a multi-year Long Term Management Strategy for Dredged Material in the Delta, the Delta LTMS.¹⁰ The goal of the Delta LTMS is to develop a one-stop permit shop. Each agency (federal, state and local) would still be legally mandated to issue individual permits. The “shop” would consolidate that process by having well-defined permit recipes that if met, will allow for the issuance of each individual permit. This model exists in the Bay and it has been successful primarily because the revenues are there (from the shipping industry) and there are a sufficiently large number of projects to support full-time agency involvement. That has resulted in workable standards and processes that can be used to secure permits. Unfortunately, the Delta LTMS suffers from funding limitations and has shown little progress. But dredging is a good example of the kind of activity in the Delta for which there needs to be one-stop permitting of some kind, as discussed further below.

Vegetation

Whether or not to allow vegetation, at least on the water side of levees, is a vexed question that is the subject of much debate both within USACE and between USACE, DWR, and other agencies. Since Hurricane Katrina, USACE has been insisting on strict implementation of their current national levee vegetation policy which prohibits woody vegetation on levees. Most fish and wildlife agencies are opposed to this policy. The situation is particularly acute in California where needed levee improvements have been blocked because levee vegetation provides critical habitat for species that are protected under both state and federal endangered species

¹⁰ <http://www.deltaltms.com/>

acts. DWR has been pushing back on this new USACE policy and took the lead in setting up the California Levees Roundtable. The Roundtable effort was able to negotiate a temporary Central Valley Flood System Improvement Framework agreement. Intelligent provisions regarding levee vegetation are also included in the draft ULDC standard. However, in the Delta there is a need to go further since appropriate vegetation on the water side of levees is a critical element of the Delta ecosystem restoration. Future Delta levee improvements should be undertaken with this in mind. Recent research conducted by USACE has in fact suggested that woody vegetation on the lower slopes of levees tends to stabilize them, although woody vegetation towards the crown might have adverse effects, and hopefully this will lead to more flexibility in the implementation of USACE policies.¹¹

Bureaucracy

The sometimes rigid organizational structure and the slow pace of many of the multitude of bureaucracies that oversee or manage the Delta and levee system present a challenge. This is complicated by cross-purposes and philosophies of levee or Delta management. Limited resources of time and funding are expended on multi-year studies like CALFED, DRMS, or the Delta LTMS, yet these studies do not produce timely results. The joint USACE-DWR study that led to Bulletin 192-82 presents a case study of this dynamic. Although it was an excellent study, it has since been repeated two or three times, which has delayed achieving the goals set forth in that report. Those goals are only now close to being achieved—30 years later—by bringing all Delta levees up to the Delta-specific PL 84-99 standard. Keeping this in mind, it is suggested that the next round of improvements to the proposed Delta levees standard that addresses earthquakes, possible sea-level rise, and vegetation of the water side of the levees, needs to be implemented in the next five years, rather than another 30 years. If funding were in place, that effort could begin immediately. It does not require another joint USACE-DWR study or studies of the kind that have been proposed in the draft DWR Framework or that are currently being proposed in the staff drafts of the Delta Plan.

Lack of one-stop permitting

There is a clear need for a one-stop permitting agency for activities in the Delta such as dredging, levee construction, restoration of the flooded islands, and other eco-system improvement activities. The responsible agency would obviously need to coordinate with the many existing agencies that have a finger in the Delta, but creation of a one-stop permitting process would eliminate unnecessary delays and costs in making the necessary improvements to the physical Delta. The impact of these delays and costs is very significant and is a major threat to the sustainability of the Delta. There is also a need for unified Delta emergency management and levee improvement entities, and that is discussed elsewhere in this report.

¹¹ U.S. Army Corps of Engineers Engineer Research and Development Center, "Initial Research into the Effects of Woody Vegetation on Levees," prepared for Headquarters, U.S. Army Corps of Engineers Washington, DC, July 2011.

Appendix F Economic Impact Analysis Overview (Part Three)

Economic impact analysis was pioneered by an economist named Wassily Leontief who began his work on the subject in 1941. At that time the impact analysis was simply an input-output table for the American economy and required matrix algebra and hand held calculators. Refinements were made to his work and in 1973 he was awarded the Nobel Prize. Now economic impact analysis is essentially a general accounting system of economic transactions between industries, businesses, and consumers that estimates the full range of impacts on sales (output), wages (personal income), jobs (employment), and taxes. It is conducted using computer software (IMPLAN is a widely used type of this software) and paints a much more comprehensive picture of the interactions in an economy. For this impact analysis the IMPLAN input-output (I/O) model was used. IMPLAN was developed in the late-1970s by the United States Forest Service to estimate the economic impact of alternative land management options. In the mid-1980s, researchers at the University of Minnesota began developing IMPLAN for non-Forest Service users. In 1993, a technology transfer agreement with the University of Minnesota led to the Minnesota IMPLAN Group (MIG) taking over development, distribution and support of IMPLAN.¹

This analysis uses data collected on each sector of the economy (i.e. agriculture, recreation and tourism, etc.) to calibrate the model and derive the direct economic impacts on the Delta. The full range of impacts that result from each sector, the total effect of that sector, is the sum of the direct, indirect, and induced effects:

- **Direct effects** are the changes in sales (output), wages (personal income), and jobs (employment) related exclusively to each sector. This includes all sales and costs incurred by both visitors and residents.
- **Indirect effects** represent the iterative impacts of inter-industry transactions as supplying industries respond to the increased demands from the direct recipient of these revenues. An example of indirect benefits would include a hotel increasing its purchase of linen to meet the demand of people staying overnight in the Delta.
- **Induced effects** reflect household consumption expenditures of direct and indirect sector employees. Examples of induced benefits include employee's expenditures on items such as retail purchases, housing, medical services, banking, and insurance.

In this analysis, the total, direct, and induced effects are presented in four ways:

- **Employment**, demonstrates the number of full- and part-time jobs generated on an annual basis.
- **Labor Income**, which is also referred to as personal income or employee compensation. It includes wages, salaries, benefits, and all other employer contributions. This measures the financial value of associated employment.
- **Value Added**, represents the total value added to a product during the production process.
- **Output**, sometimes referred to as revenue or sales, accounts for the total changes in the value of production in an industry for a given time period. This includes revenue from all sources of income to determine current activity levels.

¹ IMPLAN Website (www.implan.com) Accessed 03/30/2010.

Appendix G Crop, Salinity, and Modeling Data (Chapter 7)

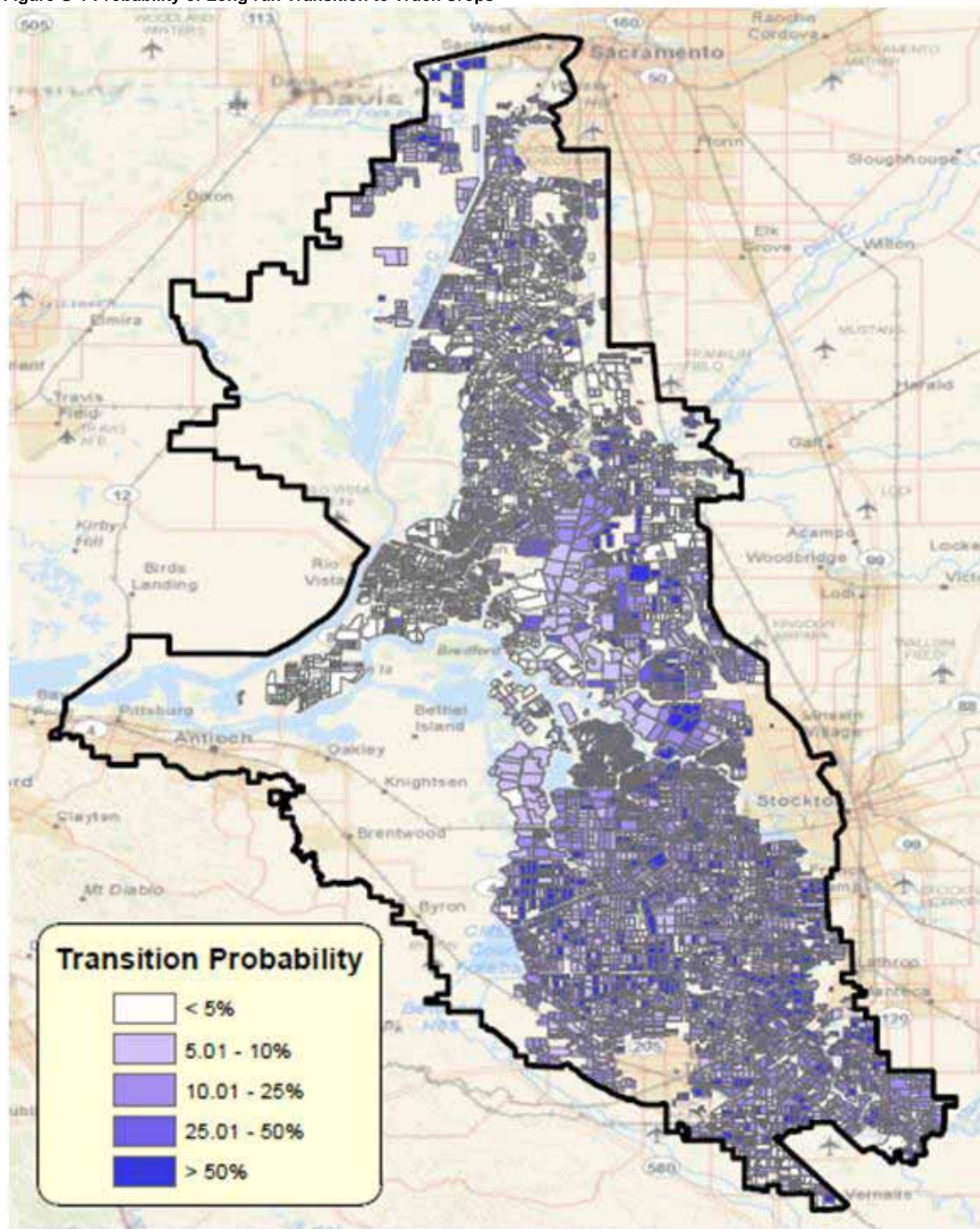
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Figure G-1 Probability of Long-run Transition to Truck Crops¹



¹ For high resolution image see <http://forecast.pacific.edu/desp-figs.html>

Table G-1 Detailed Crop Acreage

Four Counties		Sacramento		San Joaquin		Solano		Yolo	
<i>Crop</i>	<i>Acreage</i>	<i>Crop</i>	<i>Acreage</i>	<i>Crop</i>	<i>Acreage</i>	<i>Crop</i>	<i>Acreage</i>	<i>Crop</i>	<i>Acreage</i>
Corn	101,746	Corn	21,656	Corn	73,187	Pastureland	12,013	Grape, Wine	9,194
Alfalfa	77,470	Alfalfa	10,896	Alfalfa	47,840	Alfalfa	10,405	Alfalfa	8,330
Wheat	30,612	Grape, Wine	8,293	Tomato	20,671	Wheat	6,786	Wheat	4,320
Grape, Wine	28,148	Pear	5,159	Wheat	15,024	Corn	5,330	Pastureland	4,140
Tomato	25,559	Wheat	4,481	Grape, Wine	9,133	Safflower	2,637	Safflower	2,785
Pastureland	22,302	Pastureland	3,932	Asparagus	6,479	Rangeland	2,103	Rice	2,701
Safflower	9,844	Tomato	1,744	Bean, Dried	5,348	Sudangrass	1,975	Tomato	2,435
Asparagus	7,135	Safflower	1,575	Rice	3,745	Grape, Wine	1,528	Corn	1,573
Rice	7,112	Cherry	1,286	Almond	3,273	Oat	718	Ryegrass	1,462
Pear	5,843	Potato	789	Safflower	2,847	Tomato	709	Cucumber	761
Bean, Dried	5,348	Oat	720	Walnut	2,576	Sorghum	646	Triticale	477
Oat	3,699	Rice	666	Oat	2,259	Triticale	631	Pear	347
Almond	3,273	Asparagus	656	Pastureland	2,216	Ryegrass	484		
Cucumber	3,164	Sorghum	412	Potato	2,156	Turf	414		
Potato	2,944	Apple	371	Cucumber	2,079	Barley	354		
Turf	2,721			Turf	1,920	Sunflower	342		
Walnut	2,640			Pumpkin	1,820	Cucumber	324		
Ryegrass	2,415			Forage Hay/Silage	1,509	Pear	316		
Sudangrass	2,415			Grape	1,301				
Rangeland	2,415			Blueberry	1,129				
Pumpkin	2,415			Bean, Lima	1,079				
Cherry	2,415			Watermelon	968				
Forage Hay/Silage	2,415			Herb, Spice	848				
Grape	2,415			Olive	565				
Sorghum	2,415			Ryegrass	365				
Triticale	2,415			Cherry	334				
Bean, Lima	2,415								
Blueberry	2,415								
Watermelon	2,415								
Herb, Spice	2,415								
Apple	2,415								
Barley	2,415								
Olive	2,415								
Sunflower	2,415								

Table G-2 Detailed Crop Revenue

Four Counties		Sacramento		San Joaquin		Solano		Yolo	
<i>Crop</i>	<i>Revenue</i>	<i>Crop</i>	<i>Revenue</i>	<i>Crop</i>	<i>Revenue</i>	<i>Crop</i>	<i>Revenue</i>	<i>Crop</i>	<i>Revenue</i>
Tomato	\$109,715,255	Pear	\$34,280,608	Tomato	\$91,977,539	Alfalfa	\$6,971,917	Grape, Wine	\$32,717,640
Grape, Wine	\$93,863,607	Grape, Wine	\$28,469,072	Corn	\$53,542,670	Grape, Wine	\$5,041,775	Tomato	\$9,283,547
Corn	\$74,505,498	Corn	\$15,330,601	Alfalfa	\$46,083,743	Corn	\$4,527,795	Alfalfa	\$5,470,726
Alfalfa	\$63,956,076	Tomato	\$6,014,468	Asparagus	\$45,501,571	Turf	\$3,606,354	Turf	\$4,395,957
Asparagus	\$50,050,037	Cherry	\$5,947,243	Grape, Wine	\$27,635,120	Wheat	\$3,499,199	Rice	\$2,284,791
Pear	\$36,746,649	Alfalfa	\$5,429,690	Potato	\$26,186,617	Turf	\$3,604,359	Pear	\$1,521,236
Turf	\$31,643,344	Asparagus	\$4,548,465	Blueberry	\$25,090,265	Tomato	\$2,439,702	Cucumber	\$1,451,254
Potato	\$27,942,370	Cucumber	\$3,523,604	Turf	\$22,106,352	Bean, Lima	\$1,291,819	Wheat	\$1,155,695
Blueberry	\$25,255,917	Wheat	\$2,191,725	Wheat	\$10,702,596	Sudangrass	\$1,202,696	Corn	\$1,104,432
Wheat	\$17,549,215	Watermelon	\$2,049,764	Almond	\$8,776,101	Pastureland	\$1,047,534	Safflower	\$912,391
Cherry	\$8,820,843	Potato	\$1,755,753	Walnut	\$8,170,505	Safflower	\$969,242	Apple	\$903,181
Almond	\$8,776,101	Turf	\$1,536,676	Pumpkin	\$7,859,092	Pear	\$835,798		
Walnut	\$8,243,817	Rice	\$1,075,162	Pepper, Fruiting	\$6,027,982	Sunflower	\$613,111		
Watermelon	\$7,953,590	Apple	\$776,153	Watermelon	\$5,870,140	Ryegrass	\$565,516		
Pumpkin	\$7,926,678			Grape	\$4,464,366				
Cucumber	\$7,867,194			Rice	\$4,159,499				
Rice	\$7,519,452			Bean, Dried	\$3,725,947				
Pepper, Fruiting	\$6,247,592			Oat	\$3,291,265				
Grape	\$4,469,535			Cherry	\$2,614,356				
Apple	\$4,455,826			Cucumber	\$2,483,396				
Oat	\$4,195,539			Apple	\$2,477,255				
Bean, Dried	\$3,990,318			Olive	\$1,648,258				
Safflower	\$3,312,014			Squash	\$1,611,384				
Bean, Lima	\$2,668,602			Bean, Lima	\$1,376,783				
Olive	\$2,173,405			Safflower	\$1,113,799				
Pastureland	\$2,117,336			Apricot	\$1,058,741				
Squash	\$1,633,464			Mustard	\$957,110				
Sudangrass	\$1,398,634			Onion	\$892,043				
Apricot	\$1,075,470			Potato Seed	\$663,095				
Ryegrass	\$1,023,582								
Mustard	\$957,367								
Sunflower	\$954,434								
Onion	\$892,684								
Potato Seed	\$663,095								
Sorghum	\$662,718								
Onion Seed	\$581,993								
Cabbage	\$514,890								

Note:

[1] Kern County crop report value used for turf acreage, as no Delta counties report turf separately from other nursery crops.

Table G-3 Detailed Crop Categories

Deciduous	Field	Grain	Pasture	Truck		Vineyard
Almond	Alfalfa	Barley	Clover	Artichoke	Onion	Grape
Apple	Bean, Dried	Oat	Forage	Asparagus	Onion, Green	Grape, Wine
Apricot	Corn	Rye	Pastureland	Bean, Lima	Parsley	
Cherry	Mustard	Safflower	Ryegrass	Bean, Succulent	Peas	
Chestnut	Rice	Sorghum		Beet	Pepper, Fruiting	
Fig	Soybean	Triticale		Blueberry	Potato	
Kiwi	Sudangrass	Wheat		Broccoli	Pumpkin	
Nectarine	Sunflower			Cabbage	Radish	
Olive				Carrot	Spinach	
Peach				Celeriac	Squash	
Pear				Celery	Strawberry	
Pecan				Collard	Sugarbeet	
Pistachio				Cucumber	Sweet Basil	
Plum				Daikon	Sweet Corn	
Pluot				Eggplant	Swiss Chard	
Pomegranate				Fruit, Berry	Tomato	
Stone Fruit				Garlic	Turf	
Walnut				Herb, Spice	Turnip	
				Leek	Watermelon	
				Lettuce	Zucchini	
				Melon		

Table G-4 Detailed Salinity Data Summary Statistics, 2001-2010
Salinity Summary Statistics, 2001 - 2010

Entire Delta

Year	Observations	Mean	Std. Dev.
2001	7708	338.50	231.29
2002	7708	327.56	220.37
2003	7708	288.60	170.55
2004	7708	330.83	206.94
2005	7708	279.60	150.68
2006	7708	261.38	151.56
2007	7708	364.72	214.13
2008	7708	403.11	282.51
2009	7708	331.44	192.04
2010	7708	283.00	132.02

By Conservation Zone

Conservation Zone 1

Year	Observations	Mean	Std. Dev.
2001	507	435.36	107.98
2002	507	408.44	104.00
2003	507	362.27	83.54
2004	507	382.63	87.39
2005	507	413.10	98.70
2006	507	449.71	110.42
2007	507	363.15	71.50
2008	507	422.57	87.16
2009	507	382.05	80.01
2010	507	391.90	79.84

Conservation Zone 2

Year	Observations	Mean	Std. Dev.
2001	225	193.89	131.27
2002	225	188.25	121.19
2003	225	171.77	94.15
2004	225	188.08	113.77
2005	225	182.99	112.82
2006	225	186.88	125.16
2007	225	195.44	92.75
2008	225	231.01	101.14
2009	225	196.70	94.72
2010	225	187.61	97.44

Conservation Zone 3

Year	Observations	Mean	Std. Dev.
2001	1585	196.25	90.83
2002	1585	190.43	83.93
2003	1585	163.79	56.42
2004	1585	203.39	79.08
2005	1585	177.75	62.74
2006	1585	169.65	71.37
2007	1585	204.40	63.85
2008	1585	223.68	68.54
2009	1585	189.47	62.22
2010	1585	175.86	57.25

Conservation Zone 4

Year	Observations	Mean	Std. Dev.
2001	565	151.20	62.76
2002	565	142.80	51.26
2003	565	135.27	27.63
2004	565	162.31	44.16
2005	565	142.46	11.39
2006	565	125.49	19.73
2007	565	173.67	43.13
2008	565	188.99	47.19

Conservation Zone 5

Year	Observations	Mean	Std. Dev.
2001	1426	274.73	200.33
2002	1426	248.72	157.79
2003	1426	166.83	52.59
2004	1426	263.50	159.64
2005	1426	168.91	48.05
2006	1426	148.55	53.65
2007	1426	247.11	119.12
2008	1426	297.62	245.05
2009	1426	214.98	101.44
2010	1426	183.74	58.66

Conservation Zone 6

Year	Observations	Mean	Std. Dev.
2001	1099	433.14	141.47
2002	1099	410.68	145.38
2003	1099	359.71	158.66
2004	1099	404.66	148.49
2005	1099	283.79	81.10
2006	1099	236.16	63.94
2007	1099	398.38	83.68
2008	1099	434.76	87.69
2009	1099	374.82	87.88
2010	1099	349.93	81.59

Conservation Zone 7

Year	Observations	Mean	Std. Dev.
2001	1987	458.23	128.88
2002	1987	465.99	136.62
2003	1987	455.73	128.03
2004	1987	463.44	134.20
2005	1987	432.41	116.52
2006	1987	407.77	124.67
2007	1987	606.75	70.38
2008	1987	645.52	76.15
2009	1987	537.28	84.42
2010	1987	409.90	43.31

Conservation Zone 8

Year	Observations	Mean	Std. Dev.
2001	300	421.35	125.50
2002	300	403.27	132.65
2003	300	377.24	142.19
2004	300	401.84	133.72
2005	300	387.61	135.02
2006	300	376.16	140.81
2007	300	434.53	137.22
2008	300	457.21	132.91

By Restoration Opportunity Area

Cache Slough

Year	Observations	Mean	Std. Dev.
2001	301	385.59	162.37
2002	301	365.19	151.03
2003	301	317.87	125.17
2004	301	344.79	132.37
2005	301	357.13	150.75
2006	301	383.06	170.88
2007	301	325.63	111.50
2008	301	387.36	126.97
2009	301	337.78	123.43
2010	301	339.39	127.28

Cosumnes/Mokelumne

Year	Observations	Mean	Std. Dev.
2001	153	119.81	1.45
2002	153	116.92	3.67
2003	153	123.27	1.38
2004	153	141.97	5.87
2005	153	140.07	3.74
2006	153	114.96	7.87
2007	153	152.62	3.21
2008	153	164.69	3.51
2009	153	121.17	13.07
2010	153	131.80	0.88

South Delta

Year	Observations	Mean	Std. Dev.
2001	810	521.98	91.69
2002	810	528.22	101.70
2003	810	515.75	100.32
2004	810	525.59	100.12
2005	810	490.09	95.32
2006	810	466.72	111.60
2007	810	583.65	103.49
2008	810	619.11	106.90
2009	810	514.93	97.66
2010	810	416.35	40.84

West Delta

Year	Observations	Mean	Std. Dev.
2001	79	442.17	244.12
2002	79	400.12	203.37
2003	79	196.72	50.55
2004	79	425.81	215.01
2005	79	191.16	40.88
2006	79	161.57	20.60
2007	79	355.18	153.28
2008	79	441.50	267.77

Table G-5 Input Data Summary

Variable	Description	Units	Mean	Standard Deviation	Min	25th Percentile	75th Percentile	Max
ec	May-August Electroconductivity Average, 2001 - 2010	micro Siemens / cm	353.24	159.81	128.53	199.93	501.33	1932.84
acres	Field Acreage	Acres	49.9	59.81	0.01	21.92	58.18	2072.52
soil	Soil Storie Index	0-100 Point Scale	49.43	16.08	0	38	64	100
elev	Elevation	Feet	3.11	7.47	-4	0	3	56
tmax	Avg. Annual Maximum Temp.	Degrees Celsius	23.4	0.22	22.47	23.33	23.55	23.64
slope	Slope	Decimal Degrees	0.14	0.59	0	0	0	5.28
year	Annual Fixed Effects							
conzone	Conservation Zone Fixed Effects							

Table G-6 Alternative Salinity Model Specifications

Specification	Independent Variables Included
1	Salinity
2	Salinity, Time and Regional Fixed Effects
3	Salinity, Time and Regional Fixed Effects, Field Acreage
Final	Salinity, Time and Regional Fixed Effects, Field Acreage, Geophysical Characteristics

Table G-7 Likelihood Ratio Test of Alternative Salinity Model Specifications vs. Final

Specification No.	Degrees of Freedom	Test Statistic
1	94	9937.26 ***
2	30	3240.00 ***
3	25	2718.54 ***

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table G-8 Estimated Crop Category Salinity Elasticities by Model Specification

	Specification 1	Specification 2	Specification 3	Final Specification
Deciduous	-0.0650 (0.0496)	-1.4435 *** (0.1008)	-1.5347 *** (0.1017)	-0.5289 *** (0.1124)
Field	0.0484 *** (0.0122)	0.2623 *** (0.0216)	0.2937 *** (0.0217)	0.2034 *** (0.0226)
Grain	-0.1101 *** (0.0292)	0.7319 *** (0.0509)	0.7028 *** (0.0511)	0.6744 *** (0.0510)
Pasture	-0.2508 *** (0.0668)	0.3437 *** (0.1247)	0.3789 *** (0.1248)	0.8140 *** (0.1241)
Truck	0.3766 *** (0.0195)	-0.3957 *** (0.0364)	-0.4287 *** (0.0367)	-0.6150 *** (0.0381)
Vineyard	-2.5644 *** (0.0652)	-1.4846 *** (0.1259)	-1.4555 *** (0.1260)	-0.6047 *** (0.1333)

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table G-9 Multinomial Logit Estimation Results - Specification 1
ML Estimation Results - Specification 1

Dependent Variable: Crop Category	(1) Deciduous	(2) Field	(3) Grain	(4) Pasture	(5) Truck	(6) Vineyard
10-Year Average Electroconductivity (mS/cm)		0.0003 **	-0.0001	-0.0005 **	0.0013 ***	-0.0071 ***
	BASE OUTCOME	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Constant		2.1207 ***	1.0309 ***	-0.3793 ***	1.1129 ***	2.1629 ***
		(0.0583)	(0.0647)	(0.0902)	(0.0617)	(0)

Deciduous is the base outcome.

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table G-10 Multinomial Logit Estimation Results - Specification 2
ML Estimation Results - Specification 2

Dependent Variable: Crop Category	(1) Deciduous	(2) Field	(3) Grain	(4) Pasture	(5) Truck	(6) Vineyard
10-Year Average Electroconductivity (mS/cm)		0.0048 ***	0.0062 ***	0.0051 ***	0.0030 ***	-0.0001
	BASE OUTCOME	(0.0003)	(0.0003)	(0.0005)	(0.0003)	(0.0005)
Constant		2.6173 ***	1.4257 **	2.2219 ***	0.7805	-21.8104
		(0.6001)	(0.6105)	(0.6349)	(0.6842)	(34150)

Deciduous is the base outcome.

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table G-11 Multinomial Logit Estimation Results - Specification 3
ML Estimation Results - Specification 3

Dependent Variable: Crop Category	(1) Deciduous	(2) Field	(3) Grain	(4) Pasture	(5) Truck	(6) Vineyard
10-Year Average Electroconductivity (mS/cm)		0.0018 ***	0.0063 ***	0.0054 ***	0.0031 ***	0.0002
		(0.0003)	(0.0003)	(0.0005)	(0.0003)	(0.0005)
Acres	BASE OUTCOME	0.0143 ***	0.0108 ***	0.0158 ***	0.0113 ***	0.0146 ***
		(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0010)
Constant		1.8255 ***	0.8944	1.3209 **	0.2255	-24.0655
		(0.6022)	(0.6126)	(0.6378)	(0.6859)	(70449)

Deciduous is the base outcome.

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table G-12 Multinomial Logit Estimation Results – Final Specification

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
Crop Category	Deciduous	Field	Grain	Pasture	Truck	Vineyard
10-Year Average		0.0021 ***	0.0034 ***	0.0038 ***	-0.0002	-0.0002
Electroconductivity (mS/cm)	B	(0.0003)	(0.0004)	(0.0005)	(0.0004)	(0.0005)
Acres	A	0.0160 ***	0.0125 ***	0.0176 ***	-0.1053 ***	-0.0316 ***
	S	(0.0010)	(0.0010)	(0.0011)	(0.0032)	(0.0044)
Soil	E	-0.0128 ***	-0.0111 ***	-0.0488 ***	0.0132 ***	0.0166 ***
		(0.0016)	(0.0018)	(0.0028)	(0.0010)	(0.0010)
Elevation	O	-0.0938 ***	-0.0754 ***	-0.0705 ***	-0.0049 ***	0.0160 ***
	U	(0.0029)	(0.0034)	(0.0054)	(0.0017)	(0.0019)
Max Temp.	T	-1.7494 ***	-1.0668 ***	-2.8749 ***	-0.5160 **	1.6602 ***
	C	(0.2103)	(0.2243)	(0.2980)	(0.2231)	(0.2922)
Slope	O	-0.0681 *	0.0312	0.0856	-0.0539	0.0276
	M	(0.0371)	(0.0404)	(0.0635)	(0.0395)	(0.0474)
Constant	E	45.1877 ***	28.6584 ***	72.0774 ***	14.6193 ***	-66.6759
		(5.0033)	(5.3336)	(7.0376)	(5.3081)	(652517)

Deciduous is the base outcome.

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table G-13 Estimated Salinity Elasticities by Crop Categories

Deciduous	-0.5289 ***
	(0.1124)
Field	0.2034 ***
	(0.0226)
Grain	0.6744 ***
	(0.0510)
Pasture	0.8140 ***
	(0.1241)
Truck	-0.6150 ***
	(0.0381)
Vineyard	-0.6047 ***
	(0.1333)

Standard errors are reported in parentheses.

*, **, and *** indicates significance at the 90%, 95%, and 99% level, respectively.

Appendix H Recreation and Tourism (Chapter 8)

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Trends Data

Additional data is available that supports conclusions presented in Chapter 8 regarding Current Status and Trends on Recreation and Tourism in the Delta. That data is summarized below.

CA DMV records

Trends in recreation activity levels in the Delta over the last 20 years can be found in boat registrations within the Primary Market Area and also in recreation use surveys. *The 2002 Sacramento-San Joaquin Delta Boating Needs Assessment*¹ discussed trends in boating in California. Overall, it appeared that boat registration from 1980-2000 tended to be growing with overall population growth. Within this overall trend, PWC registration was rising much faster than population growth, with other types of smaller boats increasing at a much lower rate and large boats increasing at a slightly higher rate. This trend in registration matches the trends in marinas reported in the same study, as many marinas were upgrading smaller slips to larger slips to match demand. Since 2000, the general trend in boat registration has been steady statewide and flat to slightly declining within the Primary and Secondary Market Areas. Table H1 lists boating registration over the past 10 years according to the Department of Motor Vehicles (DMV) registration data. Although the number of boat registrations varies by year, the overall trend since 2000, including personal watercraft, is generally flat to declining.

Table H-1 Total Vessel Registrations by Year within the Delta Primary Market Area and Statewide

	Primary Market Area	Secondary Market Area	Statewide	Personal Watercraft ⁽¹⁾
2000	252,673	106,868	902,447	169,373
2001	266,517	114,321	961,877	180,397
2002	249,913	109,510	893,550	157,090
2003	265,295	116,979	959,849	183,266
2004	243,869	109,987	892,594	158,866
2005	257,857	117,954	956,466	185,115
2006	239,824	111,894	896,794	161,417
2007	252,855	119,461	955,730	170,421
2008	226,769	108,174	855,290	
2009	237,229	113,687	900,345	

Source: California Department of Boating and Waterways, 2010

(1) Personal Watercraft data is only available through 2007

CA DFG Hunting/Fishing Licenses

In 2009, approximately 1.2 million resident sport fishing licenses statewide were issued. That number has declined since 1997. As there are no direct data on fishing within the Delta, it has been estimated. In a 1997 survey, State Parks estimated that 23 percent of all anglers in California fished in the Delta. However, beginning in 2004, DFG required all anglers who fished within the tidal influences of the Bay-Delta and downstream of dams within the watershed to purchase a Bay-Delta Sport Fishing Enhancement Stamp. Table H2 lists those numbers. As both sets of numbers are estimates, the general magnitude is probably correct (i.e., approximately 275,000 anglers recreated in the Delta in 2009). Using this number, combined

¹ DBW 2002, pp. 6-5 - 6-14

with estimates from both USFWS and State Parks that anglers fish, on average, 12 days per year, results in approximately 3.3 million fishing activity days in the Delta in 2010.

Table H-2 Total Resident Sport Fishing Licenses by Year Statewide with Estimates on Delta Use

Year	Statewide	Delta ⁽¹⁾	Bay-Delta Sport Fishing Enhancement Stamp
1997	1,384,963	318,541	
1998	1,287,668	296,164	
1999	1,272,284	292,625	
2000	1,265,039	290,959	
2001	1,225,072	281,767	
2002	1,175,618	270,392	
2003	1,124,438	258,621	
2004	1,268,606	291,779	324,915
2005	1,244,987	286,347	308,719
2006	1,256,785	289,061	297,377
2007	1,283,506	295,206	311,405
2008	1,203,670	276,844	283,332
2009	1,179,312	271,242	284,641

Source: California Department of Fish and Game, 2010

(1) It is estimated that approximately 23% of all statewide anglers recreate in the Delta

The total number of hunting licenses issued in California over the past 10 years has increased, though at less than 10 percent. There are no estimates for how these numbers related to in-Delta hunting.

Table H-3 Total Hunting Licenses by Year Statewide

Year	Game Bird Hunting Licenses	Total Statewide Hunting Licenses
2000	945,611	1,564,806
2001	960,224	1,588,541
2002	903,670	1,536,387
2003	950,701	1,565,526
2004	974,580	1,596,861
2005	1,000,639	1,628,672
2006	1,025,345	1,659,349
2007	1,091,351	1,721,937
2008	1,041,031	1,674,004
2009	1,056,556	1,683,445

Source: California Department of Fish and Game, 2010

USDA Agricultural Tourism

The U.S. Department of Agriculture, National Agricultural Statistics Service regularly publishes a Census of Agriculture. The most recent was published in 2007. Two of the categories for which they collect data are directly relevant to this topic area – income from agri-tourism and recreational services, and value of agricultural products sold directly to individuals for human consumption.

Income from agri-tourism and recreational services includes income generated from hunting, fishing, wine tours, hay rides, etc. In 2007, there were 79 farms in the six Delta counties that reported income from this source, with a total value of almost \$4 million. The number of farms has approximately doubled since 2002, with income up more than ten-fold. Average income was \$50,000 per farm, up \$42,000 since 2002. Per-county averages ranged from \$7,000 in Alameda County to \$134,000 in Solano County.

Table H-4 Income from Farm Related Sources: 2007 and 2002
Agri-tourism and recreational services

		County					Total
		Alameda	Contra Costa	Sacramento	San Joaquin	Solano	All Delta Counties
Number of Farms	2002	4	7	9	8	3	39
	2007	4	13	18	11	13	79
	Change	-	6	9	3	10	40
Income, \$1,000	2002	undisclosed	\$ 135	undisclosed	\$ 42	\$ 100	\$ 332
	2007	\$ 29	\$ 487	\$ 435	\$ 913	\$ 1,742	\$ 3,967
	Change	-	\$ 352	-	\$ 871	\$ 1,642	\$ 3,635
Average Income Per Farm, \$1000	2002	-	\$ 19	-	\$ 5	\$ 33	\$ 9
	2007	\$ 7	\$ 37	\$ 24	\$ 83	\$ 134	\$ 50
	Change	-	\$ 18	-	\$ 78	\$ 101	\$ 42

Source: USDA, National Agricultural Statistics Service, 2007 Census of Agriculture - County Data, California

The value of agricultural products sold directly to individuals for human consumption includes the market value of products sold at roadside stands, farmers' markets, pick-your-own sites, etc. In 2007 there were 664 farms in the six Delta counties which reported income from this source, with a market value of over \$25 million. The number of farms has increased in Alameda, San Joaquin, Solano, and Yolo counties since 2002, but has declined in Contra Costa and Sacramento counties. Also, value has increased in Alameda, Contra Costa, Sacramento, and San Joaquin counties, while decreasing in Solano and Yolo counties (in spite of an increase in number of farms). Over all Delta counties, the number of farms has increased by 3.5 percent while the reported market value increased by more than 11 percent. The average market value per farm was \$38,000 in 2007, up slightly from \$35,000 in 2002.

Table H-5 Market Value of Agricultural Products Sold Including Direct Sales: 2007 and 2002

Value of agricultural products sold directly to individuals for human consumption

		County						Total
		Alameda	Contra Costa	Sacramento	San Joaquin	Solano	Yolo	All Delta Counties
Number of Farms	2002	23	79	177	200	70	92	641
	2007	29	76	143	232	89	95	664
	Change	6	(3)	(34)	32	19	3	23
Value, \$1,000	2002	\$ 168	\$ 1,163	\$ 2,054	\$ 8,165	\$ 2,610	\$ 8,308	\$ 22,468
	2007	\$ 322	\$ 1,776	\$ 3,497	\$ 11,837	\$ 1,337	\$ 6,324	\$ 25,093
	Change	\$ 154	\$ 613	\$ 1,443	\$ 3,672	\$(1,273)	\$(1,984)	\$ 2,625
Average Value Per Farm, \$1,000	2002	\$ 7	\$ 15	\$ 12	\$ 41	\$ 37	\$ 90	\$ 35
	2007	\$ 11	\$ 23	\$ 24	\$ 51	\$ 15	\$ 67	\$ 38
	Change	\$ 4	\$ 9	\$ 13	\$ 10	\$(22)	\$(24)	\$ 3

Source: USDA, National Agricultural Statistics Service, 2007 Census of Agriculture - County Data, California

The USDA data is only broken down by county, so it is unknown how many farms only in the legal Delta have agri-tourism or recreation services, or have direct sale operations. However, this data does seem to indicate that both are growing as farmers look to diversify their income streams.

United States Forest Service

As part of their *National Survey on Recreation and the Environment*, USDA Forest Service, Southern Research Station, provides results on surveys of people participating in outdoor recreation within the Local Area of El Dorado National Forest. This local area includes 27 counties surrounding El Dorado National Forest and overlaps somewhat with the Primary and Secondary Market Area. Participation rates for a sample of specific recreation activities that occur in the Delta are listed in Table H6.

Table H-6 Summary of National Survey on Recreation and the Environment (2000-2004)
Participation Rates for Selected Activities in El Dorado National Forest Local Area

Activity Type	Participation Rate
Walking for pleasure	86%
View/photograph natural scenery	67%
Visit nature centers	60%
Sightseeing	59%
Picnicking	58%
Driving for pleasure	57%
Visit historic sites	52%
Swimming in lakes, streams	49%
Bicycling (any type)	45%
Day hiking	44%
Developed camping	41%
Fishing – freshwater	28%
Motor boating	24%
Personal watercraft	12%
Sailing	7%
Hunting	7%

Statewide Tourism Data

The California Travel and Tourism Commission (CTTC) also maintains data and survey numbers on tourism and the economic impact of tourism within the State of California. Overall touring/sightseeing represented 15 percent of all visits to California in 2009, while both nature and culture visits each represented 13 percent.² Detailed data based on visitor surveys reflected specific primary activities is presented in Table H7.

Table H-7 Summary of Primary Visitor Activities to California
California Year-End 2009 Data Tables – Public Version – Primary Activities (Stays Based)

Activity Type	Participation Rate
Touring/Sightseeing	13%
Beach/Waterfront	6%
Festival/Craft Fair	4%
Museum, Art Exhibit	4%
Visit Historic Site	4%
Park: National, State	3%
Hike, Bike	3%
Camping	2%
Nature/Culture: Observe and Conserve Eco-Travel	2%
Hunt/Fish	1%
Other Adventure Sports	1%
Boat/Sail	1%

² D.K. Shifflet & Associates, Ltd., California 2009 Data Tables Public Version, prepared for the California Travel and Tourism Commission, June 2010. Pages 142-149. Can be downloaded from <http://tourism.visitcalifornia.com/media/uploads/files/editor/Research/2009%20California%20Data%20Report%20-%20Public%20Version.pdf>

Visitation Estimates Based on Demand Estimates

Visitor estimations can be derived from population numbers, using estimates of demand and participation rates. The detailed model for demand-based participation is presented here. In summary, first, participation rates for various Delta activities were determined. Following that, a determination of what percentage of the market the Delta will capture versus other recreation opportunity areas available to the Market Area is made. By combining all of these numbers into a model with population numbers, an estimate of visitation based on demand for recreation activities will result.

Tables above presented estimated participation rates for various activities based on surveys from State Parks, USFS, and USFWS. Based on these surveys, ranges for popular recreation activities in the Delta have been estimated.

Table H-8 Ranges of Participation Rates for Selected Activities Statewide in California

Activity Type	Low Range Participation Rate	Mid Range Participation Rate	High Range Participation Rate
Motor boating, personal watercraft	12%	21%	29%
Fishing – freshwater	18%	32%	45%
Sail boating	3%	7%	10%
Paddle sports	15%	19%	22%
Camping in developed sites with facilities	31%	40%	48%
RV/trailer camping with hookups	8%	12%	16%
Hunting	3%	5%	7%
Wildlife viewing, bird watching, viewing natural scenery	42%	57%	72%
Outdoor photography	32%	39%	45%
Picnicking in picnic areas	56%	68%	80%
Swimming in freshwater lakes, rivers, and/or streams	31%	50%	68%
Day hiking on trails	41%	52%	62%
Bicycling on paved surfaces	35%	40%	45%
Bicycling on unpaved surfaces and trails	9%	18%	27%
Driving for pleasure, sightseeing, driving through natural scenery	60%	74%	87%
Visiting historic or cultural sites	54%	64%	74%
Attending outdoor cultural events	43%	53%	63%
Visiting outdoor nature museums, zoos, gardens, or arboretums	51%	60%	68%

Next to be determined: what percentage of this recreation demand the Delta recreation area will capture, as compared to other competitive recreation areas as described above. Estimates for those percentages, based on professional judgment combined with knowledge of existing demand on some activities, are listed in Table H9.

Table H-9 Delta Recreation Capture Rates within the Market Area

Activity Type	Percentage of all Recreation Activity
Motor boating, personal watercraft	30.00%
Fishing - freshwater	20.00%
Sail boating	10.00%
Paddle sports	5.00%
Camping in developed sites with facilities	0.25%
RV/trailer camping with hookups	0.25%
Hunting	15.00%
Wildlife viewing, bird watching, viewing natural scenery	0.50%
Outdoor photography	0.15%
Picnicking in picnic areas	0.25%
Swimming in freshwater lakes, rivers, and/or streams	1.00%
Day hiking on trails	0.10%
Bicycling on paved surfaces	0.25%
Bicycling on unpaved surfaces and trails	0.10%
Driving for pleasure, sightseeing, driving through natural scenery	2.00%
Visiting historic or cultural sites	0.50%
Attending outdoor cultural events	2.00%
Visiting outdoor nature museums, zoos, gardens, or arboretums	0.50%

If low- and high-range participation rates are taken and multiplied by population numbers in the Primary and Secondary Market Area (estimated at approximately 12 million) by average annual days of participation from the State Parks survey, and then by capture rates for the Delta, recreation demand for each activity (activity days per year) can be estimated within the entire market area. By dividing those numbers by the average number of activities per person per day (estimated at 3.3) to eliminate duplicate counting, estimates of visitor days result. Those numbers are presented in Table H10.

Table H-10 Ranges of Recreation Demand for Market Area (Visitor Days Per Year) for selected resources and right-of-way/tourism activities (in millions) in 2010

Activity Type	Low Range Visitor Days per Year	Mid Range Visitor Days per Year	High Range Visitor Days per Year
Motor boating, personal watercraft	1.14	1.96	2.77
Fishing - freshwater	1.68	2.95	4.21
Sail boating	0.16	0.34	0.53
Paddle sports	0.13	0.16	0.19
Camping in developed sites with facilities	0.02	0.02	0.03
RV/trailer camping with hookups	0.01	0.01	0.01
Hunting	0.27	0.45	0.63
Wildlife viewing, bird watching, viewing natural scenery	0.21	0.28	0.35
Outdoor photography	0.04	0.05	0.06
Picnicking in picnic areas	0.04	0.05	0.05
Swimming in freshwater lakes, rivers, and/or streams	0.12	0.19	0.26
Day hiking on trails	0.02	0.03	0.04
Bicycling on paved surfaces	0.12	0.14	0.16
Bicycling on unpaved surfaces and trails	0.01	0.01	0.02
Driving for pleasure, sightseeing, driving through natural scenery	0.96	1.18	1.39
Visiting historic or cultural sites	0.08	0.09	0.11
Attending outdoor cultural events	0.22	0.28	0.33
Visiting outdoor nature museums, zoos, gardens, or arboretums	0.06	0.07	0.08
Totals	5.29	8.26	11.22

These numbers represent the recreation demand from the Market Area, which had previously been estimated to be approximately 85 percent of the overall demand for recreation in the Delta. Thus, in order to present a full picture of Recreation Demand, all numbers were adjusted from 85 percent, up to 100 percent (See Table H11).

Table H-11 Ranges of Recreation Demand (Visitor Days Per Year) for selected resources and right-of-way/tourism activities (in millions) in 2010

Activity Type	Low Range Visitor Days per Year	Mid Range Visitor Days per Year	High Range Visitor Days per Year
Motor boating, personal watercraft	1.35	2.30	3.26
Fishing - freshwater	1.98	3.47	4.95
Sail boating	0.19	0.40	0.62
Paddle sports	0.15	0.19	0.22
Camping in developed sites with facilities	0.02	0.03	0.04
RV/trailer camping with hookups	0.01	0.01	0.02
Hunting	0.32	0.53	0.75
Wildlife viewing, bird watching, viewing natural scenery	0.24	0.33	0.42
Outdoor photography	0.05	0.06	0.07
Picnicking in picnic areas	0.04	0.05	0.06
Swimming in freshwater lakes, rivers, and/or streams	0.14	0.22	0.30
Day hiking on trails	0.03	0.04	0.04
Bicycling on paved surfaces	0.14	0.16	0.18
Bicycling on unpaved surfaces and trails	0.01	0.02	0.02
Driving for pleasure, sightseeing, driving through natural scenery	1.13	1.38	1.64
Visiting historic or cultural sites	0.09	0.11	0.13
Attending outdoor cultural events	0.26	0.32	0.38
Visiting outdoor nature museums, zoos, gardens, or arboretums	0.07	0.08	0.09
Totals	6.23	9.71	13.20

Visitor Days were then aggregated by primary activity for economic modeling into categories of boating, fishing, and camping; hunting; other resource-related; and right-of-way and tourism. Other resource-related includes categories of wildlife viewing, bird watching, viewing natural scenery; outdoor photography; picnicking in picnic areas; and swimming in freshwater lakes, rivers and/or streams. Right-of-way and tourism includes the categories of day hiking on trails; bicycling on paved surfaces; bicycling on unpaved surfaces and trails; driving for pleasure, sightseeing, driving through natural scenery; visiting historic or cultural sites; attending outdoor cultural events; and visiting outdoor nature museums, zoos, gardens, or arboretums. A summary of visitor days by primary activity is listed in Table H12.

Table H-12 Summary of Visitor Days Per Year by Primary Activity (in millions) in 2010

Activity Type	Low Range Visitor Days per Year	Mid Range Visitor Days per Year	High Range Visitor Days per Year
Boating, Fishing, and Camping	3.70	6.40	9.10
Hunting	0.32	0.53	0.75
Other Resource-Related	0.48	0.67	0.86
ROW & Tourism	1.73	2.11	2.49
Total Visitor Days	6.23	9.71	13.20

Appendix I Select Delta Recreation Facilities (Chapter 8)

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The Delta is an established recreational destination with an array of facilities. Given the importance of these facilities and the disparate political economic geography of the Delta, it was necessary to apply a multifaceted approach to survey these facilities. The first step in researching facilities was through a query of geocoded enterprises in the 2009 National Establishments Time-Series Database (NETS).¹ This identified Delta establishments by category from January 2009 Dun and Bradstreet enterprise data. The NETS data was then augmented with information from the Delta Chamber of Commerce utilizing its online directory, its Delta Visitor's Guide and its Delta Visitor's Map.^{2, 3, 4} Further additions to the list of facilities were then made through reference to the Franko's Map of the California Delta.⁵ After these enterprises were telephonically verified as being operational, subsequent additions were made on a facility by facility basis detailed in the respective sections.

Through this process the following facilities were identified:

	Establishments
Marinas	112
Camping/RV Facilities	64
Restaurants ⁶	81
Fuel Docks	45
Boat Builders	16
Boat Dealers	35
Boat Repair Facilities	49

Delta Marinas

Verified marina's from the initial stage were further augment with reference to the Delta Protection Commission's facilities list, the Department of Boating and Waterways facilities list, and the Delta Boating website.^{7,8,9} These marinas were then verified as being operational telephonically. At all stages when contacting the marinas additional camping/recreational vehicle (RV), repair services, gas dock, restaurant, and convenience store facilities were also identified. As a result of this analysis 112 Delta marinas were identified, which are detailed in Tables I-1 & I-2 below. Of these 112 marinas: 45 had fuel docks, 23 offered repair services, 30 had restaurants, 44 offered camping/RV facilities, and 40 had convenience stores.

¹ National Establishments Time-Series (NETS) Database: 2009 Database. Walls & Associates.

² California Delta Chambers & Visitors Bureau (2011) *Explore the California Delta*. MapCo Marketing.

³ California Delta Chambers & Visitors Bureau (2010) *The California Delta Map & Visitors Guide*. MapCo Marketing.

⁴ California Delta Chambers & Visitors Bureau website: <http://californiadelta.org/links.htm> Accessed: 8/1/2011.

⁵ Nielson, F. (2009) *Franko's Map of the California Delta: The Complete Map and Guide of the San Joaquin and Sacramento Rivers for Boaters, Fishermen & Everybody Who Loves the California Delta*. Franko Maps Ltd. Corona, CA.

⁶ Restaurants listed here only include those associated with marinas, in the Primary Zone, or located in Legacy Communities.

⁷ Delta Protection Commission (DPC) Facilities List available at the DPC website: http://www.delta.ca.gov/inventory_list.htm Accessed: 8/1/2011

⁸ Department of Boating and Waterways (DBW) Facilities List available at the DBW website: <http://www.dbw.ca.gov/maps/inlinemap.asp> Accessed: 8/1/2011

⁹ Delta Boating website: <http://www.deltaboating.com/marinas-bethelisl.htm> Accessed: 8/1/2011

Table I-1 Delta Marinas (Part 1 of 2)

Marina	Fuel Dock	Repairs	Restaurant	Camping/RV	Convenience Store
5 Star Marina					
Andreas Cove Marina					
Arrowhead Harbor				Yes	
B & W Resort	Yes			Yes	Yes
Beacon Harbor Inc				Yes	
Bethel Harbor LTD	Yes	Yes		Yes	Yes
Bethel Island Marina & Dry Dock		Yes			
Big Break Marina		Yes			
Boathouse Marina	Yes				
Brannan Island KOA & Marina				Yes	Yes
Brannan Island SRA				Yes	
Bruno's Island Yacht Harbor		Yes		Yes	
Buckley Cove Marina		Yes		Yes	Yes
Bullfrog Landing & Marina	Yes				Yes
Caliente Isle Harbor & Yacht Club					
Carols Harbor & Marina					Yes
City of Antioch Marina	Yes		Yes		Yes
City of Pittsburg Marina	Yes				Yes
Clarksburg Marina					
Cliffhouse Marina & Resort LLC					
Cliffs River Marina Inc	Yes				Yes
Cruiser Haven Marina				Yes	Yes
Dagmar's Landing					
D'Anna's Bethel Island Marina Resort		Yes			Yes
Deckhands Marina		Yes			
Delta Bay Marina & RV Park	Yes			Yes	
Delta Boatworks		Yes	Yes		
Delta Marina Yacht Harbor Inc	Yes	Yes		Yes	Yes
Delta Yacht Club					
Discovery Bay Marina & Yacht Harbor	Yes	Yes	Yes		
Donavons Marina					
Driftwood Marina & Yacht Club	Yes				
Easy C's Marina					
Eddo's Harbor & RV Park Inc	Yes			Yes	Yes
Emerald Pointe Marina	Yes	Yes			
Franks Marina Inc			Yes	Yes	
Freeport Marina Inc			Yes		
Happy Harbor Marina Inc			Yes	Yes	
Hennis Marina					
Hennis Marina & Prop Shop					
Hermans & Helens Marina & Café	Yes	Yes	Yes		Yes
Hidden Harbor	Yes				
Holland Riverside Marina			Yes		Yes
King Island Marina & Resort	Yes				Yes
Ko-Ket Resort	Yes		Yes	Yes	Yes
Korth's Pirates Lair	Yes		Yes	Yes	
Ladd's Stockton Marina		Yes			Yes
Lake Washington Sailing Club					
Landing 63					
Lauritzen Yacht Harbor	Yes	Yes		Yes	Yes
Lazy M Marina	Yes				Yes
Lighthouse Landing Marina					
Lighthouse Resort and Marina			Yes	Yes	Yes
Lloyds Holiday Harbor		Yes		Yes	
Total Marinas = 112 of which:	45	23	30	44	40

Table I-2 Delta Marinas (Part 2 of 2)

Marina	Fuel Dock	Repairs	Restaurant	Camping/RV	Convenience Store
Lost Isle Resort			Yes		
Marina Del Rio					
Marine Emporium At The Bridge		Yes			Yes
Mariner Cove Marina LLC				Yes	
Mazikeen's Landing		Yes			
New Anchor Marina	Yes			Yes	Yes
New Bridge Marine Inc	Yes				
New Hope Landing				Yes	
Orwood Resort	Yes	Yes	Yes	Yes	
Outrigger Marina	Yes		Yes	Yes	
Owl Harbor Marina				Yes	Yes
Oxbow Marina	Yes				Yes
Paradise Point Marina	Yes	Yes	Yes	Yes	Yes
Perry Boat Harbor & Dry Dock		Yes			
Pittsburg Yacht Club	Yes				
Rancho Marina				Yes	
River Island Marina					
Riverpoint Landing	Yes			Yes	
Rivers Edge Marina & Resort			Yes	Yes	
Rivers End Marina & Resort				Yes	Yes
Russo's Marina	Yes		Yes	Yes	Yes
Rusty Porthole Marina					Yes
Sacramento Marina	Yes				Yes
Sacramento Yacht Club					
Saint Francis Yacht Club					
Sams Harbor					
San Joaquin Yacht Club					
San Joaquin Yacht Harbor					
Seahorse Marina					
Sherman Lake Resort					
Sherwood Harbor Marina & RV Park	Yes		Yes	Yes	
Snug Harbor Resort	Yes			Yes	Yes
Spindrift Marina	Yes		Yes	Yes	Yes
Sportsmens Inc, Yacht Club					
Stans Yolo Marina					
Stockton Downtown Marina			Yes		
Stockton Sailing Club					
Stockton Waterski Club					
Stockton Yacht Club					
Sugar Barge Marina & RV Park	Yes		Yes	Yes	Yes
Sunset Harbor Marina			Yes		
Tiki Lagun Resort & Marina	Yes			Yes	Yes
Tower Park Marina	Yes	Yes	Yes	Yes	Yes
Tracy Oasis Marina Resort	Yes			Yes	Yes
Turner Cut Resort	Yes		Yes	Yes	
Union Point Marina Bar & Grill			Yes		
Vieira's Resort	Yes		Yes	Yes	Yes
Village West Marina	Yes	Yes	Yes		
Walnut Grove Docks					
Walnut Grove Marina	Yes	Yes		Yes	
Water Front Yacht Harbor					Yes
Weber Point Yacht Club					
Whiskey Slough Marina	Yes		Yes	Yes	
Willow Berm Marina	Yes				
Willowest Harbor					
Wimpy's Marina	Yes		Yes	Yes	Yes
Windmill Cove Marina	Yes		Yes	Yes	Yes
Woods Yacht Harbor					
Total Marinas = 112 of which:	45	23	30	44	40

Camping and Recreational Vehicle Facilities

In addition to the numerous camping and RV facilities available at the marinas, there are several other facilities in the Delta. These additional camping and RV facilities are listed in Table I-3 below, nearly all of which also have boat docks. In total, we identified 64 camping and RV facilities in the Delta. Standalone camping and RV facilities identified in the initial search for establishments were supplemented with other facilities from the Delta Boating website and the SureWest Yellow Pages Directory.^{10,11} These camping and RV facilities were then verified as being operational telephonically.

Table I-3 Delta Camping and RV Facilities

Camping/RV Facility	Dock
Delta Isle RV Park	Yes
Duck Island RV Park	Yes
Islander Mobile Park	Yes
Meador's Resort	Yes
Palmero	Yes
Rio Viento	Yes
Sandy Beach Park	Yes
Santiago Island Village	No
Turtle Beach Preserve	Yes
Westgate Landing	Yes
<i>Sub-total of Camping & RV Facilities</i>	<i>10</i>
<i>Sub-total of Marinas with Camping and RV Facilities</i>	<i>44</i>
Grand Total Delta Camping and RV Facilities	64

Restaurants

In addition to the 30 restaurants part of, or locate in the marinas, there are dozens of other restaurants in the Primary Zone and/or located in the Delta's numerous Legacy Communities. We identified a further 51 restaurants, which are listed in Table I-4 below. Restaurants identified in the initial search for establishments were added with other restaurants from the Delta Boating website, the Yellow Pages Directory, and a Yahoo Local Restaurant search.^{12,13, 14} These restaurants were then verified as being operational telephonically.

¹⁰ Delta Boating website: <http://www.deltaboating.com/camping-bethelisl.htm> Accessed: 8/1/2011

¹¹ Campgrounds and RV Park Search. SureWest Directory: <http://surewestyellowpages.com/> Accessed: 8/1/2011

¹² Delta Boating website: <http://www.deltaboating.com/dining.htm> Accessed: 8/1/2011

¹³ Yellow Pages Restaurant Search. The New Yellow Pages: <http://www.yellowpages.com/> Accessed: 8/1/2011

¹⁴ Yahoo Local Restaurant Search: <http://local.yahoo.com/> Accessed: 8/1/2011

Table I-4 Delta Restaurants

Restaurant Name	Restaurant Name
25 Main Street Deli	Moore's Riverboat Restaurant and Bar #
Almas Cafe	Nines Restaurant
Al's Place	Outrigger's Restaurant
Asia Restaurant	Peter's Steak House
Basil Ruddnick's	Pineapple Restaurant
Dejacks Italian Pizza Café	Pizza Factory -Isleton
Elsias Cafe	Pizza Factory -Walnut Grove
Ernie's Restaurant and Saloon	Raul's Striper Café
Foster's Bighorn	Red Coach Deli
Giusti's #	Rio Vista Golf Club Restaurant
Grand Island Mansion* #	Riverbranch Resorts
Hawg's Café and Pizza Den	Rogelio's*
Henry's Coffee Shop	Rosie's Rockin Docks #
Island Joe's Café & Bakery	Rusty Porthole Restaurant #
Isleton Joes	Ryde Hotel* #
Jalisco's	Shelby's
La Amistad	Sonja's Country Inn
La Posada	Spindrift Restaurant
La Villa Mexican Restaurant	Subway - Rio Vista
Landing Bar & Grill	Taco Bell - Rio Vista
Levee Café	Taqueria Mexico Restaurant
Locke Garden Restaurant	The Flamingo Lounge
Lucy's	The Point Waterfront Restaurant#
McDonald's - Rio Vista	Tony's Place
Mel's Mocha & Ice Cream	Tortilla Flats
Maya's Trading Co.	
Note: *=-Hotel and #=-Dock facilities	

Boat Builders

We identified 16 boat builders in the Legal Delta, which are listed in Table I-5 below. Boat Builders identified in the initial stage were further augmented with reference to the Delta Protection Commission's facilities list.¹⁵ These Boat Builders were then verified as being operational and queried as to whether they provided boat repair services telephonically.

Table I-5 Delta Boat Dealers

Boat Builders	Boat Builders (continued)	Boat Builders (continued)
All Out Yacht Care	Michael C Dolle	Senior Boat Works
Diablo Boat Works	Pac Marine Interiors	Sheffield's Boat Works
Friendly Harbors	River City Boat Works	The Carter Group
James Contzen		

¹⁵ Delta Protection Commission (DPC) Facilities List available at the DPC website: http://www.delta.ca.gov/inventory_list.htm Accessed: 8/1/2011

Boat Dealers

We identified 38 boat dealers in the Legal Delta, which are listed in Table I-6 below. Boat dealers identified in the initial stage were further augmented with reference to the Delta Protection Commission's facilities list.¹⁶ These Boat dealers were then verified as being operational and queried as to whether they provided boat repair services telephonically.

Table I-6 Delta Boat Dealers

Boat Dealer	Boat Dealer (continued)	Boat Dealer (continued)
Antioch Yacht Sales	Gene Colver	Performance Jet Ski Boat
Bagley Boat Works	Honker Cut Marine In	Preferred Yacht Sales
Bay Yachts	K&T Scuba & Marine Service	Richard Kinzey
Bayshore Marine Inc	Landry Management Inc	Riverboat Marine Center
Boat Center Inc	Larson Marine Inc	S&H Yachting Center
Boat Professor	Marc Bay	San Joaquin Canvas
Britannia Yacht Sales Inc	Michael Richardson	Ski and Race Marine
Carlson Marine	Mike's Marine Sales & Service	Theodore Augsburg
Dale Dillard	Mobile Marine Service-Antioch	Tocci Yachts
Delta Loop Assoc.	Oceanus Marine Group, Inc	West Marine, Inc.-Stockton
Delta Sport Boats Inc	Olympic Boat Centers	West Marine, Inc.-Pittsburg
Delta Sportsman	Pacific Boat Center	Western California Yacht Sales
Delta Yacht Sales	Performance Marine Specialties	

¹⁶ Delta Protection Commission (DPC) Facilities List available at the DPC website:
http://www.delta.ca.gov/inventory_list.htm Accessed: 8/1/2011

Boat Repair Facilities

In addition to the boat repair services identified with marinas, boat builders, and boat dealers, there are several establishments whose primary business is boat repair. These boat repair establishments are listed in Table I-7. In total, we identified 82 establishments offering boat repair services in the Legal Delta. Boat repairers identified in the initial stage were further augmented with reference to the Delta Protection Commission's facilities list and the Delta Boating website.^{17, 18} These additional boat repair establishments were then verified as being operational telephonically.

Table I-7 Delta Boat Repair Services

Boat Repair Establishments	Boat Repair Establishments (cont)	Boat Repair Establishments (cont)
Ament Marine Service-Bethel Island	Delta Marine Services-Discovery Bay	Mobile Marine Services-Oakley
Ament Marine Service-Isleton	Delta Marine Services-Stockton	Nordic Marine
Aqua Marine Services	Derrick Marine Services	One Stop Car N Boat Service
Auto Truck & Marine Services	Discovery Bay Auto Boat Detail	Our Old Boat
B G S Marine Service	Discount Marine	Pacific Boat Detailing
Bay Area Yachting Solutions	Dolphin Marine	Rick's Custom Yacht Maintenance
Black Island Yacht & Dive Service	Don's Mobile Marine Service	River Marine Repair
Boatfixerguy	Economy Boat	Seaton's Marine
Brannan Canvas & Upholdstery	Hallerman's Marine	Stephens Marine Inc
Canvas Factory	Inland Marine Sales & Service	T Parks Marine Services
Capri Quarius Marine	J & H Marine	The Complete Boat
Chip's Marine Service	Jna Marine Service	Tom Newhall Boat Repair & Haulout
Custom Marine Canvas-Isleton	Knightsen Boat Works	Vee Jay Marine
Custom Marine Canvas-Rio Vista	Liden Marine	Walton's Marine Repair
Custom Yacht Service	Marine Electrical Service	West Coast Canvas
Delta Boat Repair	Melgoza's Yacht Refinishing & Repairs	Yacht Interiors & Design
<i>Subtotal of Boat Repair Establishments: 48</i>		
<i>Boat Builders with Repair Facilities: 6</i>		
<i>Boat Dealers with Repair Facilities: 5</i>		
<i>Marinas with Repair Facilities: 23</i>		
Grand Total Delta Repair Facilities: 82		

¹⁷ Delta Protection Commission (DPC) Facilities List available at the DPC website: http://www.delta.ca.gov/inventory_list.htm Accessed: 8/1/2011

¹⁸ Delta Boating website: <http://deltaboating.com/service.htm> Accessed: 8/1/2011

Appendix J Infrastructure (Chapter 9)

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Estimation of Infrastructure from DRMS Database

Several tables in the ESP chapter on infrastructure derive estimates of the quantity and value of Delta infrastructure from the Table 7-2a “Estimate of Asset Cost Damage and Repair Times – 100-year Flood (Current)” in the Department of Water Resources (DWR) *Technical Memorandum: Delta Risk Management Strategy (DRMS) Phase 1 Topical Area: Impact to Infrastructure* of June 15, 2007.¹ As mentioned in the ESP, the estimates in Table 7-2a are for a “100-year” floodplain, which is an imaginary boundary that defines the area around the Delta and is delimited in Figure 13-1 of the DRMS Infrastructure Memorandum. However, this artificial boundary included several areas outside the Legal Delta. Therefore, to avoid counting infrastructure outside of the Delta we excluded several ‘islands’ contained in Table 7-2a.² These areas can be seen in Figure 3-2 & 3-4 of the DRMS Infrastructure Memorandum.

¹ In particular : Tables 44, 47, 48, 50, 51, 52, and 53.

² The following areas were excluded: All of Suisun Marsh (SM-1 to SM-204); Elk Grove 1; Honker Bay Club; Schaffer-Pintail Tract; Simmons-Wheeler Island; Sacramento Pocket Area; Zone 36/37/38/74/77/78/90/206/207/214.

Delta Energy Infrastructure

Table J-1 Delta Energy Generation Infrastructure

Plantname	Online MW	Primary Fuel	Owner
Port of Stockton Energy District	49.90	Distillate Oil	ACME Posdef Partners LP
Keller Canyon	2.66	Landfill Gas	Ameresco
Stockton Cogen 1	55.00	Natural Gas	Air Products & Chemicals, Inc.
Riverview Energy Center	47.30	Natural Gas	Calpine
Calpine Pittsburg	55.70	Natural Gas	Calpine
Los Medanos Energy Center	594.00	Natural Gas	Calpine
Delta Energy Center	860.20	Natural Gas	Delta Energy Center, LLP
San Joaquin Cogen	48.00	Natural Gas	El Paso Merchant Energy
GWF Tracy Peaker	166.00	Natural Gas	GWF Energy LLC
J.R. Simplot Company	4.00	Natural Gas	J.R. Simplot Company
Contra Costa	680.00	Natural Gas	Mirant Corp.
Pittsburg	1984.00	Natural Gas	Mirant Corp.
Mobile GT	41.90	Natural Gas	Pacific Gas and Electric Company
Gateway Generating Station	530.00	Natural Gas	Pacific Gas and Electric Company
Corn Products	2.80	Natural Gas	
Stockton Sierra 1	22.00	Natural Gas	
Wilbur East Power Plant	19.00	Petroleum Coke	GWF Power Systems
GWF Power Plant Nicholas Road	19.00	Petroleum Coke	GWF Power Systems
GWF Power Systems L.P.	19.00	Petroleum Coke	GWF Power Systems
US Steel Posco Industries	19.00	Petroleum Coke	GWF Power Systems
Wilbur West Power Plant	22.80	Petroleum Coke	GWF Power Systems
Winddriven, Inc.	34.70	Wind	Wind Driven LLP
Tracy Biomass Plant	23.00	Woodwaste	GWF Power Systems
	5299.96		

Appendix K Legacy Communities (Chapter 10)

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Table K-1Clarksburg Population Age Distribution, 2005/2009

Age Group	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Under 18 years	233	17.5%	168,518	28.8%
18 to 20 years	47	3.5%	25,710	4.4%
21 to 34 years	257	19.3%	106,932	18.3%
35 to 54 years	376	28.3%	169,813	29.0%
55 to 64 years	168	12.6%	55,114	9.4%
65 years and over	249	18.7%	59,094	10.1%
Total Population	1,330	100.0%	585,181	100.0%

clarksburg_age

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-2 Clarksburg Population by Racial Distribution, 2005/2009

Race	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Total Population	1,330	100.0%	585,181	100.0%
<u>Not Hispanic or Latino</u>	930	69.9%	407,808	69.7%
White alone	851	64.0%	243,752	41.7%
Black or African American alone	-	0.0%	61,477	10.5%
American Indian and Alaska Native alone	-	0.0%	2,680	0.5%
Asian alone	50	3.8%	73,615	12.6%
Native Hawaiian and Other Pacific Islander alone	29	2.2%	4,237	0.7%
Some other race alone	-	0.0%	2,625	0.4%
Two or more races	-	0.0%	19,422	3.3%
<u>Hispanic or Latino</u>	400	30.1%	177,373	30.3%
White alone	362	27.2%	88,717	15.2%
Black or African American alone	-	0.0%	1,952	0.3%
American Indian and Alaska Native alone	-	0.0%	1,636	0.3%
Asian alone	-	0.0%	2,018	0.3%
Native Hawaiian and Other Pacific Islander alone	-	0.0%	129	0.0%
Some other race alone	38	2.9%	69,842	11.9%
Two or more races	-	0.0%	13,079	2.2%

clarks_racial

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-3 Clarksburg Population by Hispanic or Latino Origin, 2005/2009

Hispanic Origin	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Not Hispanic	930	69.9%	407,808	69.7%
Hispanic	400	30.1%	177,373	30.3%
Total Population	1,330	100.0%	585,181	100.0%

clarks_hisp

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-4 Clarksburg Educational Attainment (Population 25 years and older), 2005/2009

Table A-4

Delta Economic Sustainability Plan

Clarksburg Educational Attainment (Population 25 years and older), 2005/2009

Education Level Attained	Clarksburg		Legal Delta	
	Amount	%	Amount	%
No high school diploma	181	20.7%	61,684	17.2%
High school graduate/GED/Some College	401	45.8%	184,237	51.3%
Associates degree or higher	68	7.8%	32,978	9.2%
Bachelor's degree or higher	145	16.6%	56,796	15.8%
Graduate or professional degree	80	9.1%	23,323	6.5%
Population (25 yrs and over)	875	100.0%	359,018	100.0%

"clarks_edu"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-5 Clarksburg Household Income Distribution 2005/2009 (2009\$)

Annual Income	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Total Households	489	100.0%	194,248	100.0%
Less than \$15,000	52	10.6%	18,641	9.6%
\$15,000 to \$34,999	86	17.6%	32,006	16.5%
\$35,000 to \$49,999	84	17.2%	25,172	13.0%
\$50,000 to \$74,999	85	17.4%	36,381	18.7%
\$75,000 to \$99,999	24	4.9%	29,047	15.0%
\$100,000 to \$149,999	61	12.5%	32,586	16.8%
\$150,000 or more	97	19.8%	20,415	10.5%
Average Household Income	\$81,654		\$79,231	

clarks_income

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-6 Clarksburg Housing Units, 2005/2009

Item	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Total Housing Units	550	100.0%	213,010	100.0%
Occupancy Status				
Occupied	489	88.9%	194,248	91.2%
Vacant	61	11.1%	18,762	8.8%
Tenure				
Owner occupied	307	62.8%	128,503	66.2%
Renter occupied	182	37.2%	65,745	33.8%
Total Occupied	489	100.0%	194,248	100.0%

clarks_housing

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-7 Home and Work Destination Report for Clarksburg Community, 2009

Place of Residence for Clarksburg Workers	Count	Share	Place of Work for Clarksburg Residents	Count	Share
<i>Clarksburg</i> ¹	92	17%	<i>Clarksburg</i> ¹	92	18%
Sacramento city, CA	92	17%	Sacramento city, CA	85	17%
Elk Grove city, CA	38	7%	West Sacramento city, CA	19	4%
West Sacramento city, CA	26	5%	All Other Locations	302	61%
Rio Vista city, CA	18	3%			
Woodland city, CA	13	2%	Total Employed Residents	498	100%
Lodi city, CA	11	2%			
Galt city, CA	9	2%			
All Other Locations	239	44%			
Total Workers	538	100%			
Industry Class			Industry Class		
Goods Producing	447	83%	Goods Producing	143	29%
Trade, Transportation, and Utilities	10	2%	Trade, Transportation, and Utilities	77	15%
All Other Services	81	15%	All Other Services	278	56%
Total Workers	538	100%	Total Employed Residents	498	100%

clarks_dest

[1] Clarksburg community as defined by these census block groups: 061130104001 and 061130104002.

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009).

Table K-8 Clarksburg Employed Labor Force by Industry, 2005/2009

Industry	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Agriculture, forestry, fishing and hunting	135	24.7%	4,095	1.6%
Mining, quarrying, and oil and gas extraction	0	0.0%	261	0.1%
Construction	79	14.4%	23,250	9.1%
Manufacturing	85	15.5%	20,540	8.1%
Wholesale trade	0	0.0%	7,772	3.0%
Retail trade	13	2.4%	31,275	12.3%
Transportation and warehousing	0	0.0%	12,787	5.0%
Utilities	12	2.2%	2,845	1.1%
Information	8	1.5%	6,199	2.4%
Finance and insurance	81	14.8%	13,428	5.3%
Real estate and rental and leasing	0	0.0%	6,497	2.5%
Professional, scientific, and technical services	10	1.8%	13,059	5.1%
Management of companies and enterprises	0	0.0%	158	0.1%
Admin. and support and waste mgmt svcs	0	0.0%	12,688	5.0%
Educational services	23	4.2%	19,645	7.7%
Health care and social assistance	36	6.6%	32,037	12.6%
Arts, entertainment, and recreation	8	1.5%	4,144	1.6%
Accommodation and food services	0	0.0%	14,262	5.6%
Other services, except public administration	32	5.9%	12,513	4.9%
Public administration	25	4.6%	17,687	6.9%
Total Employment	547	100.0%	255,142	100.0%

clarks_emp

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-9 Clarksburg Employed Labor Force by Occupation, 2005/2009

Occupation	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Management, professional, and related	140	25.6%	81,750	32.0%
Service	42	7.7%	43,309	17.0%
Sales and office	119	21.8%	69,655	27.3%
Farming, fishing, and forestry	82	15.0%	2,748	1.1%
Construction, extraction, maintenance, and repair	123	22.5%	27,984	11.0%
Production, transportation, and material moving	41	7.5%	29,696	11.6%
Total Employed Labor Force	547	100.0%	255,142	100.0%

clarks_occu

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-10 Clarksburg Employed Labor Force by Type of Employer, 2005/2009

Type of Employer	Clarksburg		Legal Delta	
	Amount	%	Amount	%
Private For-Profit Wage and Salary	380	69.5%	173,919	68.2%
Private Not-For-Profit Wage and Salary	11	2.0%	16,478	6.5%
Local Government	46	8.4%	25,026	9.8%
State Government	37	6.8%	14,920	5.8%
Federal Government	0	0.0%	6,344	2.5%
Self-Employed in Own Not Incorporated Business	73	13.3%	18,092	7.1%
Unpaid Family Workers	0	0.0%	363	0.1%
Total Employed Labor Force	547	100.0%	255,142	100.0%

clarks_type

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-11 Clarksburg Employment, 2002-2009

Industry (NAICS)	2002	2009	Nominal Growth 2002 - 2009	Avg. Ann. Growth Rate
Agriculture, Forestry, Fishing and Hunting	335	186	(149)	-8.06%
Mining, Quarrying, and Oil and Gas Extraction	0	3	3	n/a
Utilities	0	1	1	n/a
Construction	25	104	79	22.59%
Manufacturing	2	154	152	85.99%
Wholesale Trade	0	2	2	n/a
Retail Trade	0	5	5	n/a
Transportation and Warehousing	14	2	(12)	-24.27%
Information	0	0	0	n/a
Finance and Insurance	0	0	0	n/a
Real Estate and Rental and Leasing	0	3	3	n/a
Professional, Scientific, and Technical Services	1	6	5	29.17%
Management of Companies and Enterprises	0	2	2	n/a
Admin. & Support, Waste Mgmt. and Remediation	0	1	1	n/a
Educational Services	71	40	(31)	-7.87%
Health Care and Social Assistance	0	9	9	n/a
Arts, Entertainment, and Recreation	1	1	0	0.00%
Accommodation and Food Services	0	7	7	n/a
Other Services (excluding Public Administration)	13	2	(11)	-23.46%
Public Administration	5	10	5	10.41%
Total	467	538	71	2.04%

"clarksburg"

Source: US Census Bureau LED/ LEHD

Table K-12 Walnut Grove/Locke/Ryde Population Age Distribution, 2005/2009

Table A-13

Delta Economic Sustainability Plan

Walnut Grove/Locke/Ryde Population Age Distribution, 2005/2009

Age Group	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Under 18 years	232	25.3%	252	19.5%	168,518	28.8%
18 to 20 years	14	1.5%	56	4.3%	25,710	4.4%
21 to 34 years	120	13.1%	103	8.0%	106,932	18.3%
35 to 54 years	309	33.7%	415	32.1%	169,813	29.0%
55 to 64 years	166	18.1%	194	15.0%	55,114	9.4%
65 years and over	75	8.2%	273	21.1%	59,094	10.1%
Total Population	916	100.0%	1,293	100.0%	585,181	100.0%

"walnut_age"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-13 Walnut Grove/Locke/Ryde Population by Racial Distribution, 2005/2009

Race	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Total Population	916	100.0%	1,293	100.0%	585,181	100.0%
<u>Not Hispanic or Latino</u>	546	59.6%	894	69.1%	407,808	69.7%
White alone	194	21.2%	729	56.4%	243,752	41.7%
Black or African American alone	-	0.0%	20	1.5%	61,477	10.5%
American Indian and Alaska Native alone	-	0.0%	-	0.0%	2,680	0.5%
Asian alone	352	38.4%	42	3.2%	73,615	12.6%
Native Hawaiian and Other Pacific Islander alone	-	0.0%	-	0.0%	4,237	0.7%
Some other race alone	-	0.0%	-	0.0%	2,625	0.4%
Two or more races	-	0.0%	103	8.0%	19,422	3.3%
<u>Hispanic or Latino</u>	370	40.4%	399	30.9%	177,373	30.3%
White alone	76	8.3%	51	3.9%	88,717	15.2%
Black or African American alone	-	0.0%	-	0.0%	1,952	0.3%
American Indian and Alaska Native alone	-	0.0%	-	0.0%	1,636	0.3%
Asian alone	-	0.0%	-	0.0%	2,018	0.3%
Native Hawaiian and Other Pacific Islander alone	-	0.0%	-	0.0%	129	0.0%
Some other race alone	294	32.1%	265	20.5%	69,842	11.9%
Two or more races	-	0.0%	83	6.4%	13,079	2.2%

"walnut_racial"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-14 Walnut Grove/Locke/Ryde Population by Hispanic or Latino Origin, 2005/2009
Table A-15
Delta Economic Sustainability Plan
Walnut Grove/Locke/Ryde Population by Hispanic or Latino Origin, 2005/2009

Hispanic Origin	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Not Hispanic	546	59.6%	894	69.1%	407,808	69.7%
Hispanic	370	40.4%	399	30.9%	177,373	30.3%
Total Population	916	100.0%	1,293	100.0%	585,181	100.0%

"walnut_hisp"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-15 Walnut Grove/Locke/Ryde Educational Attainment (Population 25 years and older), 2005/2009

Table A-16

Delta Economic Sustainability Plan

Walnut Grove/Locke/Ryde Educational Attainment (Population 25 years and older), 2005/2009

Education Level Attained	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
No high school diploma	168	26.5%	128	13.5%	61,684	17.2%
High school graduate/GED/Some College	260	41.0%	376	39.7%	184,237	51.3%
Associates degree or higher	27	4.3%	117	12.3%	32,978	9.2%
Bachelor's degree or higher	179	28.2%	288	30.4%	56,796	15.8%
Graduate or professional degree	0	0.0%	39	4.1%	23,323	6.5%
Population (25 yrs and over)	634	100.0%	948	100.0%	359,018	100.0%

"walnut_edu"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-16 Walnut Grove/Locke/Ryde Household Income Distribution 2005/2009 (2009\$)

Table A-17

Delta Economic Sustainability Plan

Walnut Grove/Locke/Ryde Household Income Distribution, 2005/2009 (2009\$)

Annual Income	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Total Households	364	100.0%	511	100.0%	194,248	100.0%
Less than \$15,000	164	45.1%	29	5.7%	18,641	9.6%
\$15,000 to \$34,999	43	11.8%	120	23.5%	32,006	16.5%
\$35,000 to \$49,999	79	21.7%	72	14.1%	25,172	13.0%
\$50,000 to \$74,999	52	14.3%	65	12.7%	36,381	18.7%
\$75,000 to \$99,999	26	7.1%	12	2.3%	29,047	15.0%
\$100,000 to \$149,999	0	0.0%	77	15.1%	32,586	16.8%
\$150,000 or more	0	0.0%	136	26.6%	20,415	10.5%
Avg Household Income	\$28,532		\$92,169		\$79,231	

"walnut_income"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-17 Walnut Grove/Locke/Ryde Housing Units, 2005/2009

Table A-18

Delta Economic Sustainability Plan

Walnut Grove/Locke/Ryde Housing Units, 2005/2009

Item	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Total Housing Units	364	100.0%	617	100.0%	213,010	100.0%
Occupancy Status						
Occupied	364	100.0%	511	82.8%	194,248	91.2%
Vacant	0	0.0%	106	17.2%	18,762	8.8%
Tenure						
Owner occupied	209	57.4%	362	70.8%	128,503	66.2%
Renter occupied	155	42.6%	149	29.2%	65,745	33.8%
Total Occupied	364	100.0%	511	100.0%	194,248	100.0%

"walnut_housing"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-18 Home and Work Destination Report for East Walnut Grove/Locke Community, 2009

Place of Residence for East WG/Locke Workers	Count	Share	Place of Work for East WG/Locke Residents	Count	Share
Sacramento city, CA	38	13%	Sacramento city, CA	17	9%
Elk Grove city, CA	19	7%	WG/Locke Community ¹	12	6%
Galt city, CA	18	6%	Stockton city, CA	11	6%
Stockton city, CA	16	6%	Walnut Grove CDP, CA	6	3%
Lodi city, CA	12	4%	All Other Locations	139	75%
Rio Vista city, CA	11	4%			
Walnut Grove CDP, CA	6	2%	Total Employed Residents	185	100%
Other WG/Locke Community ¹	6	2%			
All Other Locations	162	56%			
Total Workers	288	100%			
Industry Class			Industry Class		
Goods Producing	71	25%	Goods Producing	71	38%
Trade, Transportation, and Utilities	118	41%	Trade, Transportation, and Utilities	34	18%
All Other Services	99	34%	All Other Services	80	43%
Total Workers	288	100%	Total Employed Residents	185	100%

"walnut_dest"

[1] Walnut Grove/Locke community as defined by this census block group: 060670097003. BG includes Walnut Grove CDP.

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009).

Table K-19 Home and Work Destination Report for West Walnut Grove/Ryde Community, 2009

Place of Residence West WG/Ryde Workers	Count	Share	Place of Work for West WG/Ryde Residents	Count	Share
Sacramento city, CA	69	12%	<i>Ryde</i> ¹	48	10%
Galt city, CA	57	10%	Sacramento city, CA	35	8%
<i>Ryde</i> ¹	48	8%	Walnut Grove CDP, CA	21	5%
Stockton city, CA	46	8%	Stockton city, CA	19	4%
Elk Grove city, CA	32	6%	Rio Vista city, CA	17	4%
Walnut Grove CDP, CA	27	5%	All Other Locations	323	70%
All Other Locations	289	51%			
Total Workers	568	100%	Total Employed Residents	463	100%
Industry Class			Industry Class		
Goods Producing	408	72%	Goods Producing	150	32%
Trade, Transportation, and Utilities	24	4%	Trade, Transportation, and Utilities	78	17%
All Other Services	136	24%	All Other Services	235	51%
Total Workers	568	100%	Total Employed Residents	463	100%

"ryde_dest"

[1] Western Walnut Grove/Ryde community as defined by these census block groups: 060670097002 and 060670097004.

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009).

Table K-20 Walnut Grove/Locke/Ryde Employed Labor Force by Industry, 2005/2009

Industry	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Agriculture, forestry, fishing and hunting	118	31.7%	127	20.7%	4,095	1.6%
Mining, quarrying, and oil and gas extraction	0	0.0%	0	0.0%	261	0.1%
Construction	12	3.2%	47	7.7%	23,250	9.1%
Manufacturing	25	6.7%	13	2.1%	20,540	8.1%
Wholesale trade	0	0.0%	10	1.6%	7,772	3.0%
Retail trade	0	0.0%	32	5.2%	31,275	12.3%
Transportation and warehousing	0	0.0%	0	0.0%	12,787	5.0%
Utilities	0	0.0%	0	0.0%	2,845	1.1%
Information	27	7.3%	7	1.1%	6,199	2.4%
Finance and insurance	0	0.0%	34	5.5%	13,428	5.3%
Real estate and rental and leasing	0	0.0%	74	12.1%	6,497	2.5%
Professional, scientific, and technical services	28	7.5%	9	1.5%	13,059	5.1%
Management of companies and enterprises	0	0.0%	0	0.0%	158	0.1%
Admin. and support and waste mgmt svcs	128	34.4%	39	6.4%	12,688	5.0%
Educational services	34	9.1%	77	12.5%	19,645	7.7%
Health care and social assistance	0	0.0%	62	10.1%	32,037	12.6%
Arts, entertainment, and recreation	0	0.0%	0	0.0%	4,144	1.6%
Accommodation and food services	0	0.0%	13	2.1%	14,262	5.6%
Other services, except public administration	0	0.0%	0	0.0%	12,513	4.9%
Public administration	0	0.0%	70	11.4%	17,687	6.9%
Total Employment	372	100.0%	614	100.0%	255,142	100.0%

"walnut_emp"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-21 Walnut Grove/Locke/Ryde Employed Labor Force by Occupation 2005/2009

Table A-22

Delta Economic Sustainability Plan

Walnut Grove/Locke/Ryde Employed Labor Force by Occupation, 2005/2009

Occupation	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Management, professional, and related	53	14.2%	226	36.8%	81,750	32.0%
Service	9	2.4%	77	12.5%	43,309	17.0%
Sales and office	122	32.8%	240	39.1%	69,655	27.3%
Farming, fishing, and forestry	82	22.0%	61	9.9%	2,748	1.1%
Construction, extraction, maintenance, and repair	40	10.8%	10	1.6%	27,984	11.0%
Production, transportation, and material moving	66	17.7%	0	0.0%	29,696	11.6%
Total Employed Labor Force	372	100.0%	614	100.0%	255,142	100.0%

"walnut_occu"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-22 Walnut Grove/Locke/Ryde Employed Labor Force by Type of Employer, 2005/2009

Type of Employer	E. Walnut Grove/Locke		W. Walnut Grove/Ryde		Legal Delta	
	Amount	%	Amount	%	Amount	%
Private For-Profit Wage and Salary	282	75.8%	386	62.9%	173,919	68.2%
Private Not-For-Profit Wage and Salary	27	7.3%	0	0.0%	16,478	6.5%
Local Government	9	2.4%	140	22.8%	25,026	9.8%
State Government	0	0.0%	51	8.3%	14,920	5.8%
Federal Government	0	0.0%	0	0.0%	6,344	2.5%
Self-Employed in Own Not Incorporated Business	54	14.5%	37	6.0%	18,092	7.1%
Unpaid Family Workers	0	0.0%	0	0.0%	363	0.1%
Total Employed Labor Force	372	100.0%	614	100.0%	255,142	100.0%

"walnut_type"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-23 East Walnute Grove/Locke Employment, 2002-2009

Industry (NAICS)	2002	2006	2007	2008	2009	Nominal Growth 2002 - 2009	Avg. Ann. Growth Rate
Agriculture, Forestry, Fishing and Hunting	225	13	41	26	17	(208)	-30.86%
Mining, Quarrying, and Oil and Gas Extraction	0	0	0	0	1	1	n/a
Utilities	0	1	3	2	11	11	n/a
Construction	17	37	35	26	27	10	6.83%
Manufacturing	2	2	1	0	26	24	44.26%
Wholesale Trade	0	0	102	110	35	35	n/a
Retail Trade	19	16	5	9	60	41	17.85%
Transportation and Warehousing	2	14	13	17	12	10	29.17%
Information	3	2	2	1	2	(1)	-5.63%
Finance and Insurance	13	11	17	16	7	(6)	-8.46%
Real Estate and Rental and Leasing	0	0	0	0	2	2	n/a
Professional, Scientific, and Technical Services	3	7	9	15	12	9	21.90%
Management of Companies and Enterprises	0	0	0	0	1	1	n/a
Administration & Support, Waste Management and Remediation	0	1	3	1	7	7	n/a
Educational Services	32	31	33	29	30	(2)	-0.92%
Health Care and Social Assistance	0	0	9	9	10	10	n/a
Arts, Entertainment, and Recreation	8	11	0	0	5	(3)	-6.49%
Accommodation and Food Services	49	14	40	34	15	(34)	-15.56%
Other Services (excluding Public Administration)	5	1	1	1	6	1	2.64%
Public Administration	0	0	0	0	2	2	n/a
Total	378	161	314	296	288	(90)	-3.81%

"wglocke"

Source: US Census Bureau LED/ LEHD

Table K-24 West Walnut Grove/Ryde Employment, 2002-2009

Industry (NAICS)	2002	2006	2007	2008	2009	Nominal Growth 2002 - 2009	Avg. Ann. Growth Rate
Agriculture, Forestry, Fishing and Hunting	284	392	342	348	153	(131)	-8.46%
Mining, Quarrying, and Oil and Gas Extraction	0	1	0	0	0	0	n/a
Utilities	0	3	0	0	0	0	n/a
Construction	20	33	37	42	153	133	33.73%
Manufacturing	4	39	56	62	102	98	58.83%
Wholesale Trade	47	93	3	5	3	(44)	-32.50%
Retail Trade	22	9	11	8	17	(5)	-3.62%
Transportation and Warehousing	2	0	0	0	4	2	10.41%
Information	0	2	0	0	0	0	n/a
Finance and Insurance	0	0	0	0	12	12	n/a
Real Estate and Rental and Leasing	0	2	2	2	6	6	n/a
Professional, Scientific, and Technical Services	19	17	22	22	14	(5)	-4.27%
Management of Companies and Enterprises	0	0	0	0	8	8	n/a
Administration & Support, Waste Management and Remediation	0	0	1	0	20	20	n/a
Educational Services	1	0	0	0	12	11	42.62%
Health Care and Social Assistance	11	11	2	2	11	0	0.00%
Arts, Entertainment, and Recreation	0	3	8	8	8	8	n/a
Accommodation and Food Services	72	93	55	66	21	(51)	-16.14%
Other Services (excluding Public Administration)	14	8	12	16	24	10	8.00%
Public Administration	8	2	1	3	0	(8)	n/a
Total	504	708	552	584	568	64	1.72%

"ryde"

Source: US Census Bureau LED/ LEHD

Table K-25 Population Age Distribution in other Legacy Communities, 2005/2009

Table A-28

Delta Economic Sustainability Plan

Population Age Distribution in Other Legacy Communities, 2005/2009

Age Group	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Under 18 years	386	17.7%	56	11.3%	22	8.0%	168,518	28.8%
18 to 20 years	93	4.3%	28	5.7%	0	0.0%	25,710	4.4%
21 to 34 years	223	10.2%	54	10.9%	11	4.0%	106,932	18.3%
35 to 54 years	654	30.0%	141	28.5%	71	25.7%	169,813	29.0%
55 to 64 years	288	13.2%	77	15.6%	57	20.7%	55,114	9.4%
65 years and over	539	24.7%	138	27.9%	115	41.7%	59,094	10.1%
Total Population	2,183	100.0%	494	100.0%	276	100.0%	585,181	100.0%

"other_age"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-26 Population by Racial Distribution in other Legacy Communities, 2005/2009

Race	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Total Population	2,183	100.0%	494	100.0%	276	100.0%	585,181	100.0%
<u>Not Hispanic or Latino</u>	1,756	80.4%	168	34.0%	267	96.7%	407,808	69.7%
White alone	1,608	73.7%	123	24.9%	267	96.7%	243,752	41.7%
Black or African American alone	10	0.5%	-	0.0%	-	0.0%	61,477	10.5%
American Indian and Alaska Native alone	-	0.0%	-	0.0%	-	0.0%	2,680	0.5%
Asian alone	97	4.4%	35	7.1%	-	0.0%	73,615	12.6%
Native Hawaiian and Other Pacific Islander alone	-	0.0%	-	0.0%	-	0.0%	4,237	0.7%
Some other race alone	-	0.0%	-	0.0%	-	0.0%	2,625	0.4%
Two or more races	41	1.9%	10	2.0%	-	0.0%	19,422	3.3%
<u>Hispanic or Latino</u>	427	19.6%	326	66.0%	9	3.3%	177,373	30.3%
White alone	268	12.3%	214	43.3%	9	3.3%	88,717	15.2%
Black or African American alone	-	0.0%	-	0.0%	-	0.0%	1,952	0.3%
American Indian and Alaska Native alone	-	0.0%	-	0.0%	-	0.0%	1,636	0.3%
Asian alone	18	0.8%	-	0.0%	-	0.0%	2,018	0.3%
Native Hawaiian and Other Pacific Islander alone	-	0.0%	-	0.0%	-	0.0%	129	0.0%
Some other race alone	127	5.8%	87	17.6%	-	0.0%	69,842	11.9%
Two or more races	14	0.6%	25	5.1%	-	0.0%	13,079	2.2%

"other_racial"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-27 Population by Hispanic or Latino Origin in Other Legacy Communities, 2005/2009

Table A-30

Delta Economic Sustainability Plan

Population by Hispanic or Latino Origin in Other Legacy Communities, 2005/2009

Hispanic Origin	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Not Hispanic	1,756	80.4%	168	34.0%	267	96.7%	407,808	69.7%
Hispanic	427	19.6%	326	66.0%	9	3.3%	177,373	30.3%
Total Population	2,183	100.0%	494	100.0%	276	100.0%	585,181	100.0%

"other_hisp"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-28 Educational Attainment (Population 25 years and older) in Other Legacy Communities, 2005/2009

Table A-31

Delta Economic Sustainability Plan

Educational Attainment (Population 25 years and older) in Other Legacy Communities, 2005/2009

Education Level Attained	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
No high school diploma	336	20.0%	126	33.8%	53	20.9%	61,684	17.2%
High school graduate/GED/Some College	899	53.6%	163	43.7%	143	56.3%	184,237	51.3%
Associates degree	237	14.1%	0	0.0%	29	11.4%	32,978	9.2%
Bachelor's degree	152	9.1%	66	17.7%	9	3.5%	56,796	15.8%
Graduate or professional degree	52	3.1%	18	4.8%	20	7.9%	23,323	6.5%
Population (25 yrs and over)	1,676	100.0%	373	100.0%	254	100.0%	359,018	100.0%

"other_edu"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-29 Household Income Distribution in Other Legacy Communities, 2005/2009 (2009\$)

Table A-32

Delta Economic Sustainability Plan

Household Income Distribution in Other Legacy Communities, 2005/2009 (2009\$)

Annual Income	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Total Households	931	100.0%	155	100.0%	148	100.0%	194,248	100.0%
Less than \$15,000	94	10.1%	23	14.8%	50	33.8%	18,641	9.6%
\$15,000 to \$34,999	250	26.9%	35	22.6%	11	7.4%	32,006	16.5%
\$35,000 to \$49,999	110	11.8%	12	7.7%	10	6.8%	25,172	13.0%
\$50,000 to \$74,999	205	22.0%	13	8.4%	30	20.3%	36,381	18.7%
\$75,000 to \$99,999	189	20.3%	5	3.2%	18	12.2%	29,047	15.0%
\$100,000 to \$149,999	61	6.6%	67	43.2%	19	12.8%	32,586	16.8%
\$150,000 or more	22	2.4%	0	0.0%	10	6.8%	20,415	10.5%
Average Household Income	\$56,963		\$72,742		\$54,165		\$79,231	

"other_income"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-30 Housing Unites in Other Legacy Communities, 2005/2009
Table A-33
Delta Economic Sustainability Plan
Housing Units in Other Legacy Communities, 2005/2009

Item	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Total Housing Units	1,060	100.0%	155	100.0%	148	100.0%	213,010	100.0%
Occupancy Status								
Occupied	931	87.8%	155	100.0%	148	100.0%	194,248	91.2%
Vacant	129	12.2%	0	0.0%	0	0.0%	18,762	8.8%
Tenure								
Owner occupied	743	79.8%	101	65.2%	98	66.2%	128,503	66.2%
Renter occupied	188	20.2%	54	34.8%	50	33.8%	65,745	33.8%
Total Occupied	931	100.0%	155	100.0%	148	100.0%	194,248	100.0%

"other_housing"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-31 Home and Work Destination Report for Courtland Community, 2009

Place of Residence for Courtland Workers			Place of Work for Courtland Residents		
	Count	Share		Count	Share
Galt city, CA	40	11%	Sacramento city, CA	14	7%
Sacramento city, CA	39	11%	<i>Courtland</i> ¹	10	5%
Stockton city, CA	25	7%	Elk Grove city, CA	9	5%
Walnut Grove CDP, CA	25	7%	San Francisco city, CA	7	4%
Elk Grove city, CA	20	6%	Walnut Grove CDP, CA	7	4%
Lodi city, CA	15	4%	Stockton city, CA	6	3%
Rio Vista city, CA	13	4%	Arden-Arcade CDP, CA	5	3%
All Other Locations	184	51%	All Other Locations	138	70%
Total Workers	361	100%	Total Employed Residents	196	100%
Industry Class			Industry Class		
Goods Producing	343	95%	Goods Producing	58	30%
Trade, Transportation, and Utilities	11	3%	Trade, Transportation, and Utilities	39	20%
All Other Services	67	19%	All Other Services	99	51%
Total Workers	421	117%	Total Employed Residents	196	100%

"court_dest"

[1] Courtland community as defined by this census block group: 060670097001.

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009).

Table K-32 Home and Work Destination Report for Hood Community, 2009

Place of Residence for Hood Workers	Count	Share	Place of Work for Hood Residents	Count	Share
Sacramento city, CA	60	24%	Sacramento city, CA	58	21%
Citrus Heights city, CA	12	5%	Stockton city, CA	24	9%
Chico city, CA	11	4%	Roseville city, CA	10	4%
Elk Grove city, CA	10	4%	<i>Hood</i> ¹	9	3%
Yuba City city, CA	10	4%	Lodi city, CA	8	3%
<i>Hood</i> ¹	9	4%	Elk Grove city, CA	7	3%
All Other Locations	134	54%	All Other Locations	162	58%
Total Workers	246	100%	Total Employed Residents	278	100%
Industry Class			Industry Class		
Goods Producing	108	44%	Goods Producing	54	19%
Trade, Transportation, and Utilities	5	2%	Trade, Transportation, and Utilities	68	24%
All Other Services	133	54%	All Other Services	156	56%
Total Workers	246	100%	Total Employed Residents	278	100%

"hood_dest"

[1] Hood community as defined by this census block group: 060670096051.

Source: U.S. Census Bureau, OnTheMap and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2Q 2002-2009).

Table K-33 Employed Labor Force by Industry in Other Legacy Communities, 2005/2009

Industry	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Agriculture, forestry, fishing and hunting	14	1.4%	18	8.7%	10	7.6%	4,095	1.6%
Mining, quarrying, and oil and gas extraction	0	0.0%	0	0.0%	0	0.0%	261	0.1%
Construction	176	18.2%	0	0.0%	10	7.6%	23,250	9.1%
Manufacturing	100	10.3%	0	0.0%	20	15.3%	20,540	8.1%
Wholesale trade	25	2.6%	49	23.7%	20	15.3%	7,772	3.0%
Retail trade	72	7.4%	20	9.7%	9	6.9%	31,275	12.3%
Transportation and warehousing	94	9.7%	26	12.6%	0	0.0%	12,787	5.0%
Utilities	10	1.0%	0	0.0%	10	7.6%	2,845	1.1%
Information	0	0.0%	0	0.0%	0	0.0%	6,199	2.4%
Finance and insurance	0	0.0%	0	0.0%	0	0.0%	13,428	5.3%
Real estate and rental and leasing	16	1.7%	0	0.0%	0	0.0%	6,497	2.5%
Professional, scientific, and technical services	45	4.6%	17	8.2%	0	0.0%	13,059	5.1%
Management of companies and enterprises	0	0.0%	0	0.0%	0	0.0%	158	0.1%
Admin. and support and waste mgmt svcs	32	3.3%	5	2.4%	0	0.0%	12,688	5.0%
Educational services	103	10.6%	50	24.2%	11	8.4%	19,645	7.7%
Health care and social assistance	11	1.1%	7	3.4%	31	23.7%	32,037	12.6%
Arts, entertainment, and recreation	32	3.3%	0	0.0%	0	0.0%	4,144	1.6%
Accommodation and food services	145	15.0%	0	0.0%	0	0.0%	14,262	5.6%
Other services, except public administration	22	2.3%	9	4.3%	10	7.6%	12,513	4.9%
Public administration	72	7.4%	6	2.9%	0	0.0%	17,687	6.9%
Total Employment	969	100.0%	207	100.0%	131	100.0%	255,142	100.0%

"other_emp"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-34 Employed Labor Force by Occupation in Other Legacy Communities, 2005/2009

Table A-37

Delta Economic Sustainability Plan

Employed Labor Force by Occupation in Other Legacy Communities, 2005/2009

Occupation	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Management, professional, and related	157	16.2%	86	41.5%	29	22.1%	81,750	32.0%
Service	224	23.1%	33	15.9%	21	16.0%	43,309	17.0%
Sales and office	199	20.5%	76	36.7%	59	45.0%	69,655	27.3%
Farming, fishing, and forestry	3	0.3%	0	0.0%	0	0.0%	2,748	1.1%
Construction, extraction, maintenance, and repair	247	25.5%	0	0.0%	0	0.0%	27,984	11.0%
Production, transportation, and material moving	139	14.3%	12	5.8%	22	16.8%	29,696	11.6%
Total Employed Labor Force	969	100.0%	207	100.0%	131	100.0%	255,142	100.0%

"other_occu"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-35 Employed Labor Force by Type of Employer in Other Legacy Communities, 2005/2009

Type of Employer	Isleton		Courtland		Hood		Legal Delta	
	Amount	%	Amount	%	Amount	%	Amount	%
Private For-Profit Wage and Salary	625	64.5%	91	44.0%	60	45.8%	173,919	68.2%
Private Not-For-Profit Wage and Salary	11	1.1%	21	10.1%	30	22.9%	16,478	6.5%
Local Government	120	12.4%	57	27.5%	11	8.4%	25,026	9.8%
State Government	70	7.2%	20	9.7%	0	0.0%	14,920	5.8%
Federal Government	64	6.6%	10	4.8%	0	0.0%	6,344	2.5%
Self-Employed in Own Not Incorporated Business	79	8.2%	8	3.9%	30	22.9%	18,092	7.1%
Unpaid Family Workers	0	0.0%	0	0.0%	0	0.0%	363	0.1%
Total Employed Labor Force	969	100.0%	207	100.0%	131	100.0%	255,142	100.0%

"other_type"

Source: 2005-2009 American Community Survey 5-Year Estimates.

Table K-36 Courtland Employment, 2002-2009

Industry (NAICS)	2002	2009	Nominal Growth 2002 - 2009	Avg. Ann. Growth Rate
Agriculture, Forestry, Fishing and Hunting	297	122	(175)	-11.94%
Mining, Quarrying, and Oil and Gas Extraction	0	1	1	n/a
Utilities	0	1	1	n/a
Construction	4	133	129	64.97%
Manufacturing	17	87	70	26.27%
Wholesale Trade	48	3	(45)	-32.70%
Retail Trade	3	6	3	10.41%
Transportation and Warehousing	0	1	1	n/a
Information	1	0	(1)	n/a
Finance and Insurance	0	1	1	n/a
Real Estate and Rental and Leasing	5	1	(4)	-20.54%
Professional, Scientific, and Technical Services	9	5	(4)	-8.05%
Management of Companies and Enterprises	0	1	1	n/a
Administration & Support, Waste Management and Remediation	0	9	9	n/a
Educational Services	49	33	(16)	-5.49%
Health Care and Social Assistance	9	4	(5)	-10.94%
Arts, Entertainment, and Recreation	0	2	2	n/a
Accommodation and Food Services	0	6	6	n/a
Other Services (excluding Public Administration)	11	4	(7)	-13.46%
Public Administration	3	1	(2)	-14.52%
Total	456	421	(35)	-1.13%

"courtland"

Source: US Census Bureau LED/ LEHD

Table K-37 Hood Employment, 2002-2009

Industry (NAICS)	2002	2009	Nominal Growth 2002 - 2009	Avg. Ann. Growth Rate
Agriculture, Forestry, Fishing and Hunting	7	9	2	3.66%
Mining, Quarrying, and Oil and Gas Extraction	0	1	1	n/a
Utilities	0	0	0	n/a
Construction	47	64	17	4.51%
Manufacturing	1	34	33	65.49%
Wholesale Trade	0	1	1	n/a
Retail Trade	27	4	(23)	-23.87%
Transportation and Warehousing	1	0	(1)	n/a
Information	16	7	(9)	-11.14%
Finance and Insurance	2	17	15	35.76%
Real Estate and Rental and Leasing	1	2	1	10.41%
Professional, Scientific, and Technical Services	0	25	25	n/a
Management of Companies and Enterprises	0	9	9	n/a
Administration & Support, Waste Management and Remediation	18	17	(1)	-0.81%
Educational Services	0	3	3	n/a
Health Care and Social Assistance	1	18	17	51.12%
Arts, Entertainment, and Recreation	8	6	(2)	-4.03%
Accommodation and Food Services	18	17	(1)	-0.81%
Other Services (excluding Public Administration)	11	12	1	1.25%
Public Administration	0	0	0	n/a
Total	158	246	88	6.53%

"hood"

Source: US Census Bureau LED/ LEHD

Appendix L Local Government Services in the Delta (Part Three)

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Introduction

This appendix presents existing conditions associated with selected local government services in the Legal Delta, focusing on 1) law enforcement, 2) fire protection / first response, and 3) educational services. The section first considers the overall framework for the provision these public services then provides a high-level assessment of services in unincorporated Sacramento and Yolo Counties, where the Legacy Communities are located.

The local governance structure in the Delta is complex, with a multifaceted network of counties, cities, special districts, state agencies, and other service providers. To establish existing conditions associated with government services in the Delta, the assessment relies on budgetary documents and interviews. Due to the rural nature of the area and limited data regarding the government services in the Delta, the analysis relies heavily on information derived from interviews. Through this process, the Economic Sustainability Plan endeavors to identify the following:

- Service providers
- Services provided
- Service levels
- Service funding sources

Overview of Public Services

California's local governance system relies on counties, cities, special districts, and school districts to provide public services. The delivery of services in California is generally structured as follows:

- **Counties** serve as agents of the state for social services and health programs; provide countywide services (e.g., jails, district attorney, assessor, and elections); and supply municipal services in unincorporated areas. In general, California counties are funded primarily by intergovernmental transfers (primarily from the state and federal sources) as well as property, sales, and other taxes.¹
- **Cities** control local land use and municipal services. Some cities provide a wide range of municipal services (e.g., police, fire, parks, and library) while other cities rely on their county or special districts to provide some of these services. City funding generally comes from local taxes, fees, and service charges.
- **Special Districts** usually provide a single service (e.g., fire protection or waste disposal) within specified boundaries that often cross city and county borders. To pay for their regular operations, special districts generate revenue from taxes, benefit assessments, and service charges.²

¹ Legislative Analysts Office
(http://www.lao.ca.gov/handouts/Conf_Comm/2010/Overview_CA_Local_Gov_6_15_10.pdf)

² California Special Districts Association
(http://www.cstda.net/index.php?option=com_remository&Itemid=247&func=startdown&id=12)

- **K-12 and Community College Districts** provide educational services at the local level. School districts receive funding from the state (including the state lottery), local sources, and the federal government.³

There are 14 cities and 6 counties wholly or partially located within the Legal Delta, as shown in Table L-1 below.

Table L-1 Cities and Counties within the Legal Delta

<u>Delta Cities</u>	<u>Delta Counties</u>
Antioch	Alameda
Brentwood	Contra Costa
Isleton	Sacramento
Lathrop	San Joaquin
Lodi	Solano
Manteca	Yolo
Oakley	
Pittsburg	
Rio Vista	
Sacramento	
Stockton	
Tracy	
West Sacramento	
Galt PD	
Lathrop PD	

With no incorporated cities within the Primary Zone, these rural areas receive services from a wide assortment of service providers, as shown in Table L-2 below.⁴ It is common for service providers from outside the Primary Zone may provide backup support for large-scale incidents.

Table L-2 Government Service Providers in the Legacy Communities and Delta Primary Zone

Primary Zone County	Law Enforcement	Fire Protection/ First Responders	Schools
Sacramento County	Sacramento County Sheriff Isleton Police Department	River Delta Fire District Courtland Fire Department	River Delta School District
Yolo County	Yolo County Sheriff	Clarksburg Fire Protection District	River Delta School District
San Joaquin County	San Joaquin County Sheriff	Montezuma Fire Protection District	Tracy Unified School District Lincoln Unified
Solano County	Solano County Sheriff	Rio Vista Fire Department	Farifield Suisun Unified
Contra Costa County	Contra Costa County Sheriff	East Contra Costa Fire Protection District	Knightsen Elementary School District Liberty Union High School District Oakley Union Elementary

³ Timar, 2006 ([http://irepp.stanford.edu/documents/GDF/STUDIES/02-Timar/2-Timar\(3-07\).pdf](http://irepp.stanford.edu/documents/GDF/STUDIES/02-Timar/2-Timar(3-07).pdf))

⁴ This assessment focuses on Legacy Communities, which are in unincorporated Sacramento and Yolo, plus Isleton, which is an incorporated city but is located outside the Primary Zone.

Source: Economic & Planning Systems, Inc.

In the Secondary Zone, cities generally handle their own police and fire protection. School districts provide educational services throughout the Legal Delta. In unincorporated areas, law enforcement services are generally provided by the county Sheriff's offices, and fire protection/first response services are generally provided by small (largely volunteer) regional fire protection districts. Table L-3 presents a list of service providers within the geographic range of the secondary zone.

Table L-3 Public Safety Service Providers-Secondary Delta

Police	Fire
Contra Costa County Sheriff	Stockton Fire Department
Alameda County Sheriff	Tracy Fire Department
Sacramento County Sheriff	Thornton Fire District
Yolo County Sheriff	Contra Costa County Fire Protection District
San Joaquin County Sheriff	Cosumnes Fire Department
Solano County Sheriff	Lathrop Manteca Fire District
Sacramento PD	Cal Fire SCU (Tracy)
Rio Vista PD	Rio Vista Fire Department
Stockton PD	City of West Sacramento Fire Department
Elk Grove PD	East Contra Costa Fire Protection District
Antioch PD	Montezuma Hills Fire District
Pittsburg PD	Ryer Island Fire Protection District
Tracy PD	
Galt PD	
Lathrop PD	

Sources: various police/ sheriff departments, fire districts, and firedepartmentdirectory.com

Public Services in the Legacy Communities

Due to the scale and complexity of government services in the Delta, this chapter focuses on public services provided by Sacramento and Yolo Counties, with emphasis on assessing service levels in the Legacy Communities.

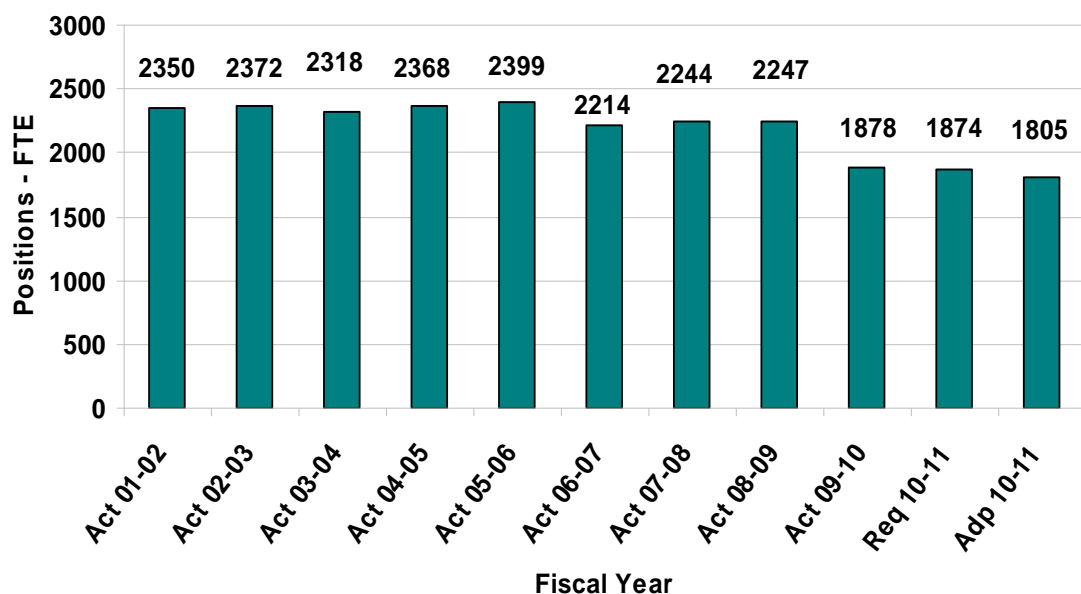
Law Enforcement and Emergency Response Services

County sheriff's departments provide police protection and public safety services to unincorporated county areas in the Delta. In addition to traditional crime prevention, patrol, and detective services, each of the counties in the Legacy Delta also maintain marine divisions which patrol the waterways. Since these County sheriff's departments are responsible for providing protection for very large areas and population bases, it is very difficult to distinguish the budgetary issues that are specific to the small Delta communities. However, interviews with the various staff have provided a basic overview of the staffing requirements and service provision issues for the rural Delta areas.

Sacramento County Sheriff's Department

In Sacramento County, the Sheriff's Department is responsible for public protection and support services, field investigations, and correctional and court services. The Sacramento County Sheriff's Department has a total adopted annual budget amount of \$330.4 million for the 2010/11 fiscal year, which is approximately 5 percent higher than the previous year's actual budget. Nearly 80 percent of this budget is allocated to employee salaries and benefits. County-wide, the Sacramento County Sheriff's Department is currently staffed with 1,805 positions. This staffing level is significantly fewer than five years earlier, as shown in Figure L-1 below.

Figure L-1 Sacramento County Sheriff's Department Staffing Trend



Source: Sacramento County

Although staffing levels are falling, crimes and calls for service are actually increasing. Calls for service increased by ten percent from Fiscal Year 2009/ 10 to Fiscal Year 2010/ 11, and violent crimes have increased 46 percent during this same period.⁵ These trends suggest that staffing levels do not meet current requirements for service, and alternative methods of funding may need to be explored in the future in order to provide adequate police protection in Sacramento County.

The Sacramento County Sheriff's Florin Service Center serves all of South Sacramento, including the areas of the Primary and Secondary Zones of the Delta, and many of the Legacy Communities such as Courtland, Hood, Ryde, Locke, and Walnut Grove. There are 16 officers that patrol this area. recently reduced from 23 due to budget cuts. According to Sacramento County, these budget cuts have had an impact upon the ability to provide adequate service in the Delta regions of Sacramento County since this area is quite large⁶. Most of the crimes in the

⁵ Violent crimes include homicide and assault with a deadly weapon. Information derived from Sacramento County Sheriff's Budget for Fiscal Year 11/12.

⁶ Personal communication with Laura Grossman, Sacramento County Sheriff Crime Prevention Specialist (September 2, 2011).

Delta are similar to the types of crimes observed throughout Sacramento County. However, there are a high number of drowning incidents in the Delta due to the presence of major waterways.⁷

The Sacramento County Sheriff's Office also operates a Marine Enforcement Unit that patrols the Sacramento River and other navigable waterways of Sacramento County. This patrol unit is currently operating on an annual budget allocation of approximately \$405,000 (FY 2010/ 11), which funds the salary of 4 full-time staff members (the department also uses retired deputies on an on-call basis). The Marine Enforcement Unit is funded through state grants, and is responsible for patrolling Delta waterways in Sacramento County. These duties include enforcing boating safety laws, providing educational enforcement, and removing abandoned vessels.

Yolo County Sheriff-Coroner

In Yolo County, the Sheriff-Coroner's Department provides police patrol services, animal shelter/ control, the County Coroner's section, and the operation of the county detention facilities. The Sheriff-Coroner Department has a recommended total budget amount of \$26.5 million for the 2010/ 11 fiscal year, which is 7 percent lower than the prior year. Nearly 85 percent of this budget is allocated to salaries and benefits, which funds 243 of the total 267 authorized positions in the Department. The Sheriff-Coroner Department is funded through a variety of sources, including charges for services, state/ federal grants, public safety sales tax, and local general fund appropriations (which are comprised primarily of property tax and sales tax).⁸

The Yolo County Sheriff-Coroner department currently has 54 total positions, including 39 funded positions for patrol officers. The number of funded positions has been reduced over the past few years due to departmental budget cuts. However, 5 officers will be added to the department in October 2011 due to AB 109, which requires the transfer of prison inmates from state to county jails. The additional officers will be funded with a dedicated portion of state sales tax revenue and Vehicle License Fees (VLF), as outlined in trailer bills AB 118 and SB 89.

There is one resident deputy and an additional general patrol deputy assigned to the Clarksburg area.⁹ There is always at least one deputy on duty in the Clarksburg area. In recent years, two resident deputies patrolled this area. However, one of these resident deputies was reassigned to general patrol as a cost-cutting measure. Typical crimes in the Clarksburg area include stolen car abandonments and trespassing (typically fishermen on levees). There recently have been a high number of copper thefts at the irrigation pumps in Clarksburg, but this has been seen throughout the county as well.¹⁰

Yolo County also operates a Marine Patrol unit which is currently staffed by two full-time officers and six volunteer patrol personnel. The Marine Patrol unit is primarily funded through a grant by the US Department of Boating and Waterways, although some County general fund revenue is generally allocated in normal budget years. Currently, staffing levels are reduced due to budgetary constraints.

⁷ Personal communication with Laura Grossman, Sacramento County Sheriff Crime Prevention Specialist (September 2, 2011).

⁸ Yolo County Budget, Fiscal Year 2010/ 11.

⁹ Personal communication with Yolo County Sheriff Lieutenant Martin Torres (September 8, 2011).

¹⁰ Personal communication with Yolo County Sheriff Lieutenant Martin Torres (September 8, 2011).

Other Law Enforcement Service Providers

In addition to County services, Cities in the Delta provide services to residents and offer supplemental backup public safety and police protection on an as-needed basis. Isleton has its own small police department, which is funded through general fund appropriations and grants from the state. The police department currently has 2 funded officers and 5 reserves. The number of funded officers has decreased from 6 over the past few years due to budget reductions. Representatives from the Isleton police department have remarked that officers work 12 hour shifts and with only 2 officers, there are not enough officers to cover all of the shifts when the reserves are unavailable.¹¹ In addition, the City of Rio Vista has indicated that City services are sometimes extended to underserved areas of the Delta

Fire Protection/ First Response

The rural nature of the Delta does not necessitate the need for urban levels of fire protection services, and the fire protection responsibilities are distributed to several small fire protection districts that are spread throughout the Delta region.

Clarksburg Fire Protection/ First Responders

Fire Protection, emergency response, and emergency flood protection services in the Clarksburg area are provided by the Clarksburg Fire Protection District Department, which has 7 staff members and 20 volunteers. According to representatives of the district, this level of staffing appears to be adequate at the current time, but up to twice this many employees could be needed by 2020, given increasing activity on Delta roads and waterways.¹² The Clarksburg Fire Protection District is largely funded by property taxes and fire suppression assessments, although grants and fundraisers also augment funding for the district.

River Delta Fire District

Originally formed in 1941 as the Isleton Fire District, the River Delta Fire District was re-established in May 2004. The River Delta Fire District boundary covers approximately 15 square miles which centers on the community of Isleton and also includes Oxbow Marina, Tyler Island, Grand Island, and a large portion of Brannon Island. This service area is comprised of approximately 1,500 full-time residents, which can swell to 15,000 people in the summer months as visitors come to the area for recreational purposes.

The district functions as a volunteer station, and there are currently 28 volunteers, which allows the department to be staffed 24 hours a day 7 days a week. Typical calls for service include structure fires, vehicle fires, grass fires, boat fires, medical calls, vehicle accidents, floods, levee breaks, etc. The district responds to approximately 325 emergency calls per year.

Courtland Fire Department

Established in 1942, the Courtland Fire Department is a long-standing local institution in Courtland. It is governed by a 3-member Board of Directors who are elected to 4-year terms. The Courtland Fire Department boundary covers over 33 square miles, which is comprised of over 2,500 citizens in the rural areas of Sacramento County. The Courtland Fire Department also provides mutual assistance to Elk Grove, Walnut Grove, and Sacramento. The Courtland Fire Department maintains two fire stations, one located in Courtland and the other in Hood.

¹¹ Personal communication with Linda Garcia, Isleton Police Department (September 2, 2011).

¹² Clarksburg Fire Protection District (<http://clarksburgfire.com/>).

The Courtland Fire Department has over 22 uniformed volunteer firefighters who provide fire protection services such as fire suppression, emergency medical services, hazardous materials mitigation, fire prevention, training and public education, and apparatus maintenance. The Courtland Fire Department is primarily funded by property tax revenue.

Other Fire Suppression/ First Responders

In addition to the fire districts within the Primary Zone described above, nearby cities such as West Sacramento, Rio Vista, and others provide relief fire suppression and emergency services when warranted. The Rio Vista Fire District currently has 6 full-time positions funded, and approximately 18 volunteers/reserves. The fire district covers 38 square miles, which includes Brannan Island, Twitchell Island, and Sherman Island. The fire district is primarily funded through the City of Rio Vista general fund, although the city also receives funding from the Delta Fire Protection District. The Delta Fire Protection District contracts with the City of Rio Vista to provide fire services. Most of the calls that the Rio Vista Fire District receives for the Delta are water-related injuries.

Educational Services

The River Delta School District provides educational services for a large portion of the Primary Zone, including all of the Legacy Communities. The district's boundaries include portions of Yolo, Sacramento, and Solano counties. Students who reside in other areas of the Primary Zone (in either San Joaquin or Contra Costa counties) generally attend schools in one of the following districts:

- Tracy Unified
- Stockton Unified
- Lodi Unified
- Lincoln Unified
- Manteca Unified

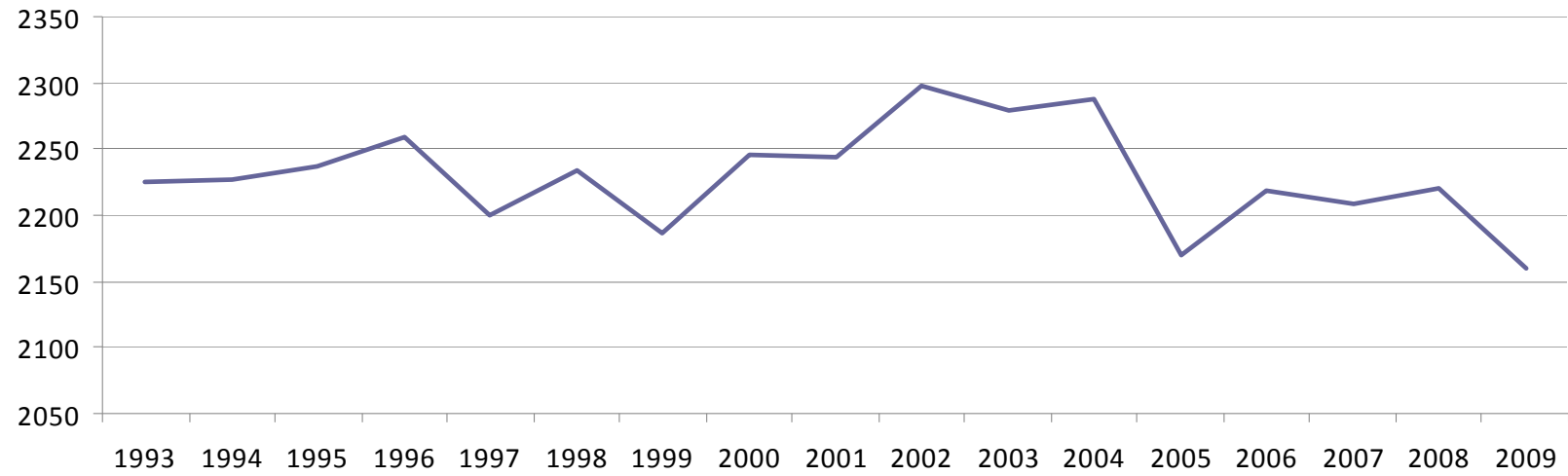
The River Delta School District is currently comprised of 10 schools, including 5 elementary schools, 2 middle schools, 2 high schools, and 1 high / elementary (alternative school). These schools are located in the following Delta communities:

- Clarksburg
- Courtland
- Walnut Grove
- Isleton
- Rio Vista

Enrollment

The River Delta School District has seen fluctuations in enrollment over the past twenty years; however, enrollment has generally ranged between 2,150 and 2,300 students. According to school district representatives, the current enrollment for the River Delta Unified School District is 2,020, the lowest level in the district's recent history. This trend is consistent with socioeconomic analysis presented in Chapter 2, which identified that population growth in the Primary Zone is flat and the existing households are aging.

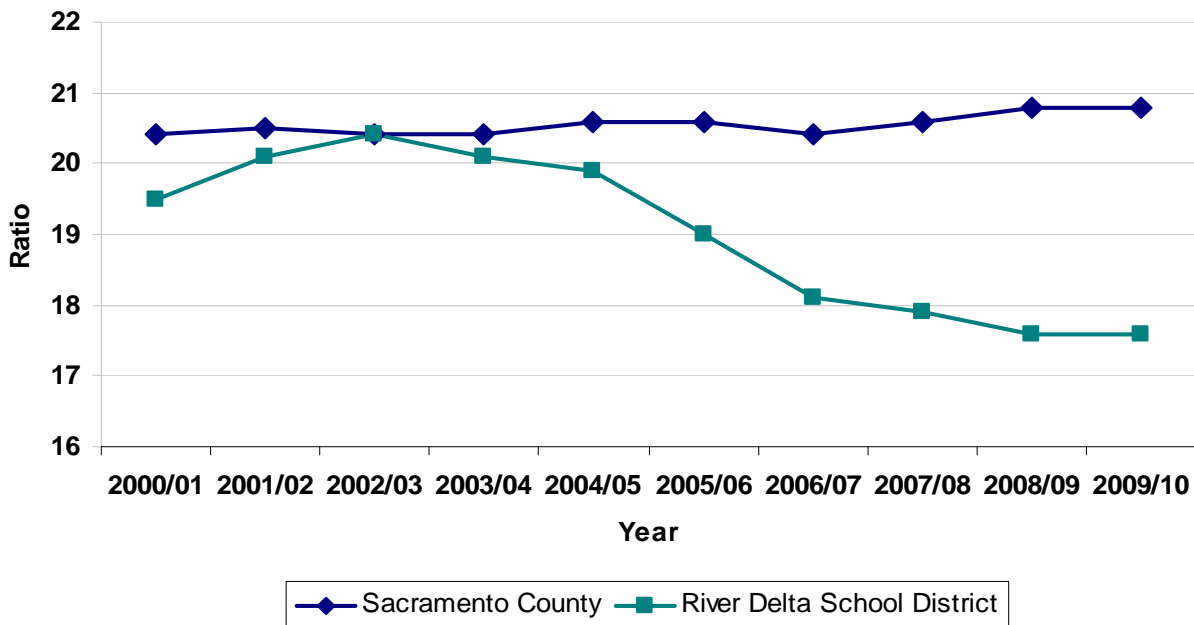
Figure L-2 River Delta Unified Enrollment Trend



Performance Indicators

The River Delta School District has a very good reputation for educational quality and civic contribution within the district's small, close-knit community. However, declining enrollment, school closures, and recent performance statistics indicate potential concerns. According to the California Department of Education, the River Delta School District has among the lowest Academic Performance Index (API) scores in the region, substantially lower than those in California overall. However, the student-teacher ratios in River Delta indicate a well-staffed district. The figure below shows student-teacher ratios at River Delta, as compared to the rest of Sacramento County. As shown, the student-teacher ratios were similar until 2002/03, at which point the student-teacher ratios at River Delta began to decline, indicating more teachers were available to students. This ratio was last reported at approximately 18 students per teacher, among the lowest in the Sacramento region.

Figure L-3 Student-Teacher Ratios, River Delta School District and Sacramento County



In 2005, the Clarksburg elementary school closed and then reopened several years later as a charter school. The new school is included in the River Delta School District budget but operates largely autonomously. The Delta Elementary Charter School serves the communities of Clarksburg and West Sacramento.

Appendix M Emergency Preparedness (Chapter 5)

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1 Emergency Response in the Sacramento-San Joaquin Delta

1.1 The Current Response System – A Critical Review

Many of the existing systems that make up the State flood control system have been critically reviewed in great detail in the Delta policy discussions. The Standardized Emergency Management System (SEMS) which structures emergency response in California has not received the same level of attention. Instead, there has been a tendency to merely provide a description of SEMS in policy documents as if it were a given. But significant progress in emergency response efficiency requires that SEMS be as critically reviewed as any other system that determines the quality of flood control in the State.

Such an effort to identify the “inefficiencies” that exist within SEMS, as with any system, would move us well beyond the mere encouragement of more exercises and training. Encouraging more efficient application of the current system is certainly good. But making the current system more efficient is better. The following brief critical review of SEMS provides just a few examples of issues with SEMS as it has been applied in the Delta that bear discussion and possible action.

1.1.1 *Incident Command and Political/Jurisdictional Boundaries*

A long-time principal of California emergency response has been that “command is local”. In other words, the local political jurisdiction within which an emergency occurs retains control, i.e. “incident command”, of the response within its boundaries regardless of how many other jurisdictions or levels of government respond to help, or how many other surrounding jurisdictions are also impacted. This principal has colored to a large extent how local and State agencies view their roles in an emergency.

A result of this principal is that emergency response in a geographically widespread disaster in California can best be described as “a multitude of individual jurisdictions independently responding to their own local problems under a State-maintained structure for sharing resources and information”. The potential for increased response efficiency through creation of a regional (multi-county) “command” element that could formally influence these many individual local responses from a better overall perspective has not been realized. While theoretically possible within SEMS, the idea of a regional “area command” has not been generally pursued in some part because of the “command is local” mindset.

But the creation of a regional “command” element over a multi-county area (e.g. the Delta), even if cumbersome from the involvement of multiple agencies, could add significant benefits to emergency response efficiency. It would provide a mechanism to cause local jurisdictions and State agencies to conform their individual actions to some extent to a bigger picture. One only has to picture a major emergency with multiple mass evacuations crisscrossing local political lines to see this point. Such a scenario in mind, one can even envision the potential for assigning specific roles and functions to local jurisdictions and State agencies to perform on behalf of all impacted jurisdictions as part of a single, integrated, regional response plan.

Addressing this “inefficiency” in SEMS would also begin to break down its current total reliance on artificial political or administrative lines to determine response structure. Instead, more logical and efficient field operational structures based on areas of obvious interdependence and ease of mutual assistance would be possible in the Delta. The limited transportation systems of the Delta alone make such flexibility critical to achieving the most efficient response possible in a major catastrophic flood. But the increasing growth of State population and geographically

extended critical infrastructure will require such regional response systems, with their expanded organizational scale, at some point if we are to effectively deal with increasingly complex disasters that are regional in scope.

1.1.2 The Incident Command System (ICS)

The establishment of the ICS as a common organizational system for emergency response in California was an epochal accomplishment. The National Incident Management System (NIMS) subsequently mirrored the California system to a great extent. But unfortunately this success clouds the fact that the logic of this common system has not been fully exploited in the Delta.

In order to see the missed potential, imagine all the bakers of the Country coming together to develop a common system for baking a cake. They end up formally identifying 100 ingredients that can be used to bake a cake. They all agree on what each ingredient will be named and what function each ingredient will serve in a cake. But nothing in this new organizational system for baking cakes prevents each baker from combining the ingredients differently for his or her specific cake, even if all the cakes are to meet the same need, e.g. a wedding.

The same situation exists with the ICS. In ICS there is a common top organizational layer that everyone uses to organize their response command. But each jurisdiction decides at the time how to organize most response functions below that level. For example, as it is now, multiple jurisdictions conducting large simultaneous evacuations in a future major flood in the Delta will almost certainly organize the way they carry out this task quite differently, while all still formally adhering to the “system”.

Sharing of resources across county lines, or creation of suddenly needed cross-jurisdictional “unified commands”, will have to struggle through this “inefficiency”. Lack of commonality in response structure also hinders creation of regional response systems. But discussion on how to organize key response functions in common across the Delta has yet to happen. Elimination of this “inefficiency” will require that we agree at some point to bake similar “cakes” to deal with similar response needs in a future multi-jurisdictional flood.

1.1.3 The Limits to Mutual Aid

Yet another system that California prides itself on is the statewide mutual aid system. Implemented in the 1950’s through a master agreement signed by all State political subdivisions, it has provided an efficient mechanism for sharing resources between political jurisdictions over decades. But, unfortunately, there are still “inefficiencies” in the system that particularly effect flood response in the Delta.

The California Master Mutual Aid Agreement basically addressed the sharing of resources found within all political jurisdictions for their common day-to-day functions, e.g. fire trucks. The Agreement’s intent was to facilitate the back and forth sharing of these resources as jurisdictions suddenly found they temporarily needed more, a disaster for example. This sharing per the Agreement was to be at no cost to the requesting jurisdiction (outside of providing support to their temporary helpers) since it was felt that everyone would end up reciprocating everyone else over time.

But the Agreement, and the idea of “free” mutual aid, disappears when the resource needed by an impacted jurisdiction must be purchased, or is a service provided by a private business which wants to be paid. No jurisdiction or State agency is required under the Master Mutual Aid

Agreement to pay for such a resource or service on behalf of a jurisdiction that finds it does not have the funds or cash flow to do it itself.

This issue is critical in the Delta where many actions needed to prevent levee failure, or contain a flood in the event of a breach, involve large direct expenditures for the purchase of expensive bulk materials and equipment or to obtain the services of private vendors. The jurisdictions with primary responsibility for preventing levee failures, the reclamation districts, very often do not have adequate cash flow to initiate these actions. But if the responsible local jurisdiction does not have the funds then appealing to “mutual aid” does not guarantee an automatic, prompt, response by other jurisdictions or levels of government. This is particularly so when other local jurisdictions or State agencies don’t have ready cash at the start of the emergency any more than the requesting jurisdiction.

The mutual aid system subsequently can break down and delays ensue as agencies struggle to find adequate funds to act in the face of an imminent flooding threat. Surprisingly, obtuse Federal Emergency Management Agency (FEMA) disaster assistance rules means that agencies must also find the will to help with a levee in the face of a real possibility that federal financial assistance for these direct costs may not be forthcoming. This mutual aid “inefficiency” exposes flood response to potential bureaucratic and system delays as jurisdictions struggle with an issue that the Master Mutual Aid Agreement did not address.

1.1.4 Training, Experience, Public Education, and the Travails of Sisyphus

There is no doubt that ongoing disaster training and exercises should be encouraged. But one should recognize the limitations inherent in disaster training programs in civil government. For one thing, civil government is not like the U.S. Army, which can spend a significant portion of its time training for a potential future crisis since that is its primary mission. Civil government is primarily staffed to perform its non-crisis day-to-day service missions. Disaster training must be squeezed in between these increasingly pressing duties.

This inherent characteristic of civil government ensures that only a small proportion of time can be spent by even key local government or State agency staff to prepare for disaster response. The beneficial results of any training accomplished are then continually degraded over time by the frequent staff turnover that occurs through promotion, transfers, or departures. The long intervals between major floods aggravates this ongoing training struggle while at the same time ensuring that whatever training is in place at the time of the crisis is supplemented with only a limited amount of practical experience.

The logical outcome of this inherent preparedness “inefficiency” is that the development of SEMS disaster plans and protocols must assume that the professionals on duty when a flood strikes have only limited training and little practical experience. This places a premium on efficiency in ensuring that responders can quickly visualize at least a basic strategy for responding to a problem created by a flood. If efficiently given this initial help, they can then better apply their common sense and basic skills to the details of the problem at hand to quickly organize an effective response.

Such additional efficiency is gained by ensuring that key response information and protocols are collected and displayed in a way that allows more rapid assimilation and comprehension by responders operating under significant time pressures. This means that the traditional wordy binder plan that is famously never read when the crisis hits must make way for innovative use of

maps, Geographical Information Systems (GIS), and other more intuitive ways for displaying critical protocols and information in a rapidly changing environment.

Educating the public on the flood threat poses a similar problem. Yes, ongoing public education campaigns are a good thing. But public officials must be realistic about the results of such “sunny day” efforts. The long interval between floods means that people who paid attention once will forget (or lose the flyers), many people won’t pay attention in the first place (it is a sunny day, right), and people will move out and new people arrive. Again, while ongoing education efforts must be maintained, the only prudent course for emergency officials is to assume that when the floods arrives a significant portion of the population will lack a clear understanding of the dynamics of a flood event and what to do if evacuation or self-rescue is required.

As with the responder training problem, this means that more efficient systems for providing information at the time that the threat materializes must be put in place. One advantage in the Delta is that for the vast majority of floods there is a period of warning as the flood builds up. Better systems and formats for providing information than traditional telephone banks, news releases, or mailers must be in place to ensure that this warning time can be effectively used when you finally have everyone’s attention.

1.2 The Current Response System – A Conceptual Approach to its Improvement

Even the above few examples of system inefficiencies allow a potentially fruitful conceptual approach to improving response to be developed that goes beyond encouragement to become more efficient in applying the current system. This could be summarized as follows.

1.2.1 *Move toward a regional response system*

Move toward a regional response system by formally identifying the legal Delta as the geographic basis for integrated mutual aid, decision making, and information sharing processes during major floods. Floods occur within hydrological basins and it is the jurisdictions within a common hydrological basin that are interdependent and must work together to reduce the overall impact. But the current SEMS structure overlaid on the Delta hydrological basin divides it into five operational areas (counties and their independent cities and reclamation districts), two different mutual aid regions, and other legal and administrative “boundaries”.

1.2.2 *Recognize the limited transportation and unique geography of the Delta*

Recognize the limited transportation and unique geography of the Delta by pre-identifying local field unified commands for public safety and flood fight operations based on mutually dependent leveed areas and greatest efficiency in movement of mutual support instead of necessarily on political or administrative boundaries. Develop a common ICS organization for these pre-identified “commands” to facilitate the sharing of resources and the rapid re-organization of command boundaries that may be demanded as the crisis develops.

1.2.3 *Address the limits of mutual aid in Delta floods*

Address the limits of mutual aid in Delta floods by developing an emergency funding protocol that would ensure that emergency actions to prevent or contain flooding that require large direct expenditures can be rapidly undertaken by the jurisdiction or agency best placed to act.

1.2.4 Address the struggle to maintain adequate training and experience for flood response

Address the struggle to maintain adequate training and experience for flood response by developing more easily used response plans using state-of-the-art mapping and GIS. Move away from traditional “user-unfriendly” binder plans to such state-of-the-art interactive systems to display critical response information in a more accessible, rapidly shared, and easily updated format.

1.2.5 Address the need for integrated and efficient systems for rapidly providing safety information to the public at the beginning of a flood event

Install an integrated public education system where each component meets a specific information need of the public. Telephone notification systems for short warnings and instructions, mobile low-power radio transmitters for repeating longer public advisories, and interactive websites for rapid acquisition of evacuation and safety information are an example of an integrated system. Ease of understanding of information is also critical. Wordy brochures should be replaced with maps, graphics, and pictures using intuitive symbols and a minimum of words to relay critical information. Use of maps provides the advantage of providing information in a geographical context where the user can visualize their location and the area around them.

2 Reports and Current State/Local/Regional Planning Efforts

In any discussion on improving emergency response in the Delta, the recommendations of the emergency managers actually responsible for disaster response in the Delta are obviously important. Two reports jointly developed by those emergency managers are either available or shortly to be released as described below.

It is also important to be aware of current efforts to comprehensively address Delta emergency response issues. These existing efforts will, in all likelihood, be the mechanisms for implementing recommended preparedness actions that come out of the Delta policy debate.

2.1 The Sacramento-San Joaquin Delta Flood Response Group White Paper

In 2007, the five Delta counties signed an “Agreement for Participation in Sacramento-San Joaquin Delta Flood Response Group”. This Agreement established a joint planning effort for improving Delta flood response which continued through 2009. The Group issued a white paper in 2008 entitled “Basis for Regional Flood Response Planning” which outlined an approach to improving flood response in the Delta. The meetings of this group were suspended upon passage of Senate Bill (SB) 27 in 2009 and the results of those discussions carried over into that new planning process.

2.2 The SB27 Multi-Hazard Task Force Report

In 2009, the Governor signed SB 27 which required the California Emergency Management Agency (CalEMA) to form a multi-hazard coordination task force to develop a strategy for improving emergency response in the Sacramento-San Joaquin Delta. The task force was composed of a representative from each of the five Delta counties, the Department of Water Resources (DWR), and the Delta Protection Commission (DPC). The task force report is completed and scheduled to be forwarded to the Governor and legislature in early 2012.

2.3 DWR Flood Emergency Planning, Preparedness, and Response Program

The DWR has initiated a comprehensive program for improving the Department's response to major floods using funds from the Delta bonds. Primary direct actions under this program involve developing an internal plan that will improve the State's ability to provide real-time flood conditions information and warning, assist with minimizing adverse environmental impacts and loss of critical infrastructure, and prevent disruption of water supply. The program also includes development of additional State emergency response facilities in the Delta. These State actions will be coordinated with the plans of other Delta flood response agencies. In regard to local preparedness and response, this DWR program will provide grants to local governments to support local action.

In 2011, the DWR initiated the first of those grants to local governments. One grant package with total available funds of \$5 million for Delta communications equipment was released in October 2011. A second grant package with total available funding of \$5 million for local flood preparedness and response projects is due to be released in early 2012. Local jurisdictions throughout the Central Valley can apply for funding under the second grant although the draft guidance indicated that priority will be to the Delta.

2.4 Sacramento-San Joaquin Delta Regional Flood Response Project

In August 2011, upon release of DWR draft guidance for its first preparedness grants to locals, the DPC sponsored the Sacramento-San Joaquin Delta Regional Flood Response Project. The objective of this initiative was to improve local use of available funds by providing a mechanism for joint, regional, action by Delta jurisdictions in the application for funding and subsequent implementation of preparedness projects. Programs for improving State response would be complemented with a more efficient, integrated, local effort to improve local response capabilities. This project is more fully described in the following section.

2.5 CalEMA Delta Catastrophic Flood Incident Plan

Although the SB27 report has not yet been released, the CalEMA has allocated funds to begin work on a Delta Catastrophic Flood Incident Plan proposed in the draft report. This plan would incorporate many of the specific preparedness actions recommended in that and other reports. Details of this effort are not yet available but will be forthcoming from that agency following completion of initial scoping meetings.

3 Sacramento-San Joaquin Delta Regional Flood Response Project

3.1 Background

Common past practice when the state or federal governments issue a grant to local governments has been for eligible local jurisdictions to develop individual, separate, applications for funding. In the case of the bond-funded flood preparedness grants to be issued by the DWR, the DPC is sponsoring an effort to bring local jurisdictions within the legal Delta together to jointly develop a regional grant application. Such a joint effort would allow Delta-wide regional response projects to be envisioned and more consistent and integrated local response capabilities to be developed.

As an initial act, the DPC agreed in May 2011 to serve as the lead applicant for any regional funding request developed jointly by participating Delta agencies and jurisdictions. Local jurisdictions were invited to provide input and indicate their participation in the regional project through submission of a letter of support to the DPC.

The role of the DPC in this effort is to facilitate joint action by acting as a lead for necessary bureaucratic requirements for funding or implementation actions. The DPC will also act as the public focus for informing the public and receiving general input. The DPC expects that participating Delta jurisdictions themselves will jointly oversee implementation of funded regional projects through a steering committee in cooperation with CalEMA, DWR, and federal agencies

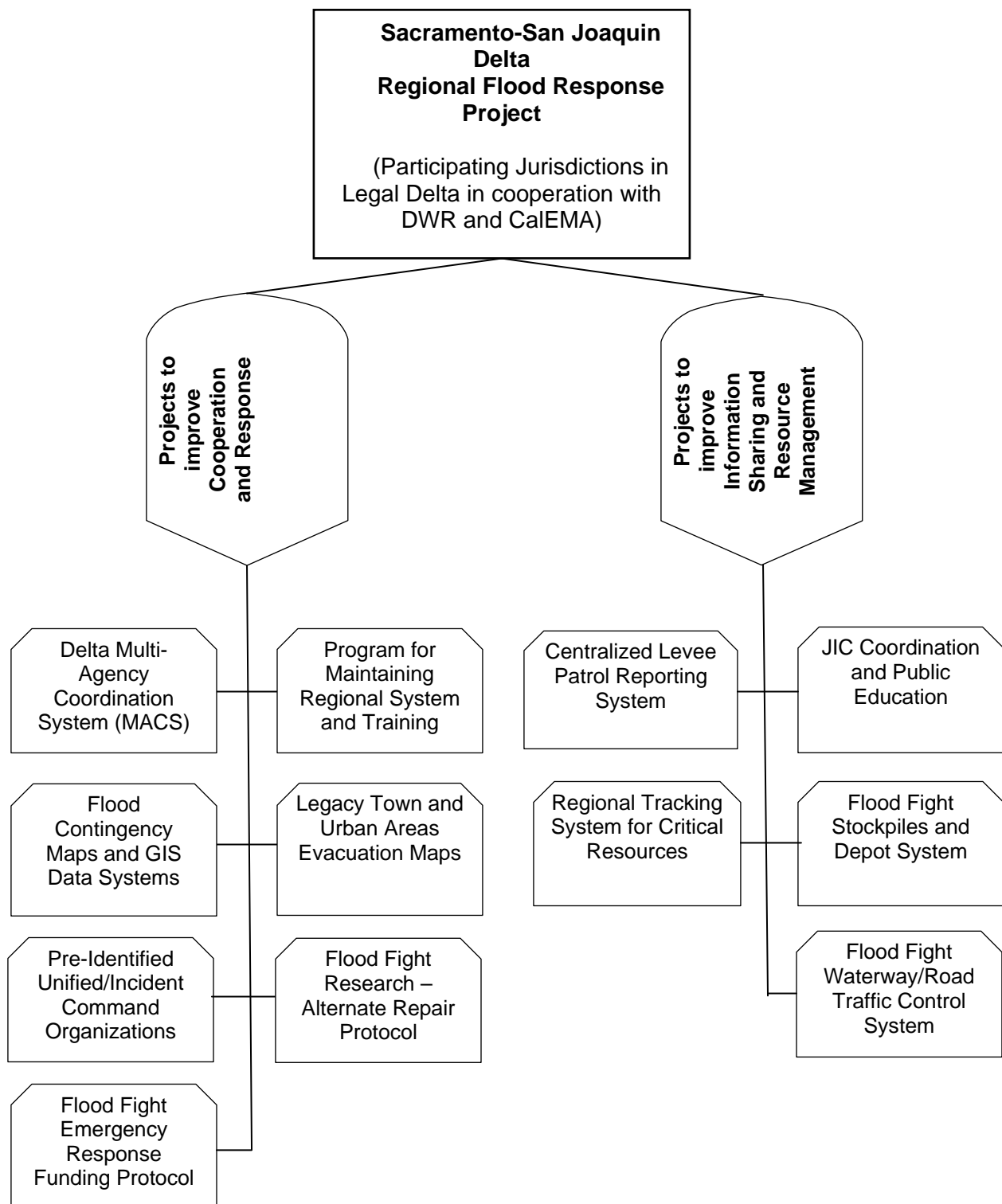
3.2 Project Status

This project was initiated in August with acquisition of a project facilitator. An initial list of proposed regional preparedness projects was developed through research and a focus group meeting held in Walnut Grove on August 31st. A project summary document was subsequently distributed explaining the project, providing the initial list of specific regional projects under consideration, and describing the process for providing input and support.

Five open meetings were held at locations throughout the Delta in October. Additional separate meetings with key agencies, flood control associations, and utilities were held by the project facilitator. There has been additional ongoing correspondence during this entire period with Delta interests to obtain input and answer questions about the project.

A final list of potential projects was issued in December. A description of these projects is included below in Figure 1 and in Section 4. The regional application will be finalized upon receipt of grant guidance by the focus group and a regional application submitted through the DPC within the application period. Further funding opportunities will then be explored to supplement any funding forthcoming from the DWR grant.

Figure 1 Summary Chart of Regional Preparedness Project



4 Description of Proposed Regional Preparedness Projects

1) Delta Multi-Agency Coordination System (MACS) – Regional Project #1

Description: Procedures, communications systems, and supplies for implementing a regional multi-agency coordination system to create a unified Delta area of operations. Identify & train staff and obtain needed equipment

Funding Request: \$250,000 to develop procedures and obtain equipment

2) Program for Maintaining Regional System and Training – Regional Project #2

Description: Develop a maintenance program for regional systems and a training program for Delta officials to meet FEMA requirements for disaster reimbursement and ensure effective response.

Funding Request: \$75,000 to develop program and provide training guidelines

3) Flood Contingency Maps and GIS data – Regional Project #3

Description: Flood contingency maps for entire Delta with preliminary engineering designs for emergency actions identified on maps such as relief cuts and emergency berms. Develop advanced GIS model for display and real-time update of maps. Flood Contingency maps will include evacuation information for rural, lightly populated areas. Develop GIS databases and information exchange systems on critical infrastructure for use in creating real-time maps and in emergency operating conditions. See www.sjmap.org/oesmg for examples.

Funding Request: \$1,100,000 to complete maps, engineering designs for emergency actions, and remote GIS data collection systems

4) Legacy Town and Urban Areas Evacuation Maps – Regional Project #4

Description: Develop user friendly evacuation maps for legacy towns and urbanized areas of the Delta showing detailed evacuation procedures for responders. Related maps developed for use by residents. This effort will be coordinated with new State Regional Evacuation System. See www.sjmap.org/oesmg for examples.

Funding Request: \$250,000 to complete maps and post for easy accessibility

5) Pre-identified Unified/ Incident Command Organizations – Regional Project #5

Description: Pre-identify Public Safety and Flood Fight Incident and Unified Commands in order to improve local operations as well as coordination between mutually dependent areas of Delta.

Funding Request: \$75,000 to plan commands, obtain supplies, and create map of command areas

6) Centralized Levee Patrol Reporting System – Regional Project #6

Description: Develop a web-based or other easily accessible system to post real-time levee conditions to reduce problems that arise from lack of easily accessible information on the status of Delta levees and leveed areas

Funding Request: \$200,000 to develop patrol reporting tool and buy equipment for patrols and information display

7) Joint Information Center Coordination and Public Education – Regional Project #7

Description: Develop tools/protocols to allow operational area joint information centers to share information through the MACS. Install public education and notification systems in operational areas

Funding Request: \$200,000 to develop protocols and design education systems

8) Flood Fight Research – Alternate Levee Breach Repair Protocol – Regional Project #8

Description: Design and test protocol for sealing breaches or underpasses with sheet pile or the U.S. Army Corps of Engineers (USACE) Rapid Repair of Levee Breaches devices to address the shortage of dredges for quickly placing rock and fill in potential multiple breaches and the need to rapidly fill underpasses to contain floods.

Funding Request: \$500,000 to develop and test protocols for use of sheet pile or USACE equipment

9) Regional Tracking System for Critical Resources – Regional Project #9

Description: Web-based system for tracking exact location, status, and mission of resources identified as critical or limited by Delta MACS Group throughout the Delta. Agencies with critical resources could post their availability to allow rapid sharing and transport of the closest available resource to a problem site. System would allow mutual aid systems to better manage and move critical/limited resources within the Delta.

Funding Request: \$200,000 to create tracking system and operational procedures

10) Flood Fight Emergency Response Funding Protocol – Regional Project #10

Description: SB27 report calls for development of a protocol for ensuring funds are immediately available for engineering response to critical threats to levees. Project would explore modification of California Disaster Assistance Act or creation of new fund to ensure that response to critical levee problems is not delayed due to lack of appropriations, cash flow, or other possible sources of delay to action.

Funding Request: \$150,000 to determine basis for funding protocol and criteria and procedures for accessing and using advance funds

11) Flood Fight Resources Stockpiles and Depots System – Regional Project #11

Description: Develop flood fight resources stockpile and depot system to which all Levee Maintaining Agencies have equal access. Coordinate with DWR stockpile programs to avoid overlap and duplication. Conduct an assessment of general needs for responding to levee problems as well as resources needed to implement specific emergency actions to contain floods identified in the flood contingency mapping process. Use results for system design

Funding Request: \$125,000 for Phase I - Design System and assess stockpile needs; \$600,000 for Phase II - Acquire resources

12) Flood Fight Resource Waterway & Roadway Traffic Control System – Regional Project #12

Description: Establish a traffic control system for the Delta similar to Coast Guard systems in the SF Bay that could monitor, route, and plan movement of critical supplies on roadways, waterways, and utilities in a disaster and also assist with movement of perishable commodities out of isolated agricultural areas. Ensure that the limited Delta transport system is used as effectively as possible, particularly if seriously impaired for long periods by extensive flooding.

Funding Request: \$250,000 to develop protocols and identify needed communications systems/organizational equipment to implement system in a disaster